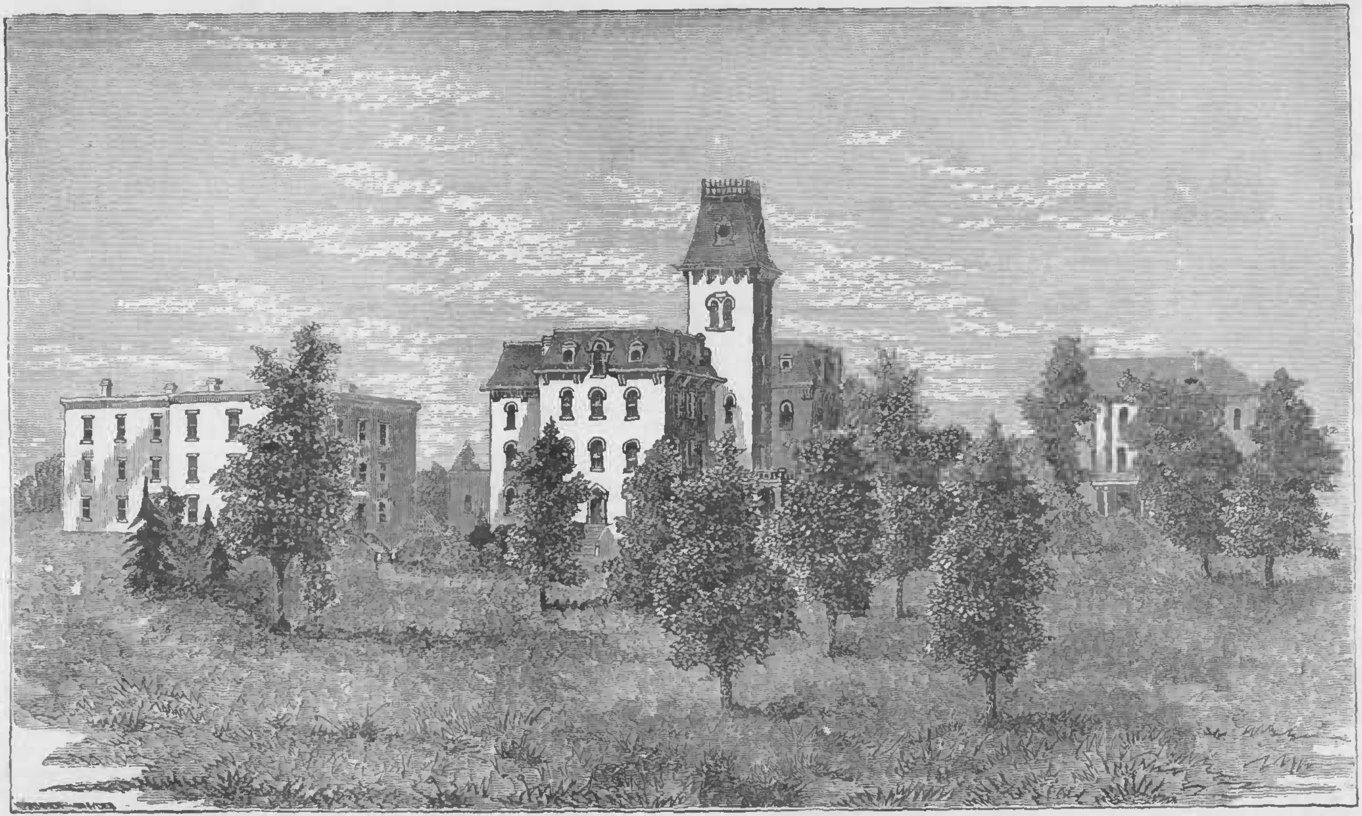

MICHIGAN AGRICULTURAL COLLEGE, LANSING, MICH.

PLATE I

REPORT

OF THE

COMMISSIONER OF AGRICULTURE

FOR

THE YEAR 1875.

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FULL-PAGE ILLUSTRATIONS.

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REPORT

OF THE

COMMISSIONER OF AGRICULTURE.

DEPARTMENT OF AGRICULTURE,
Washington, October 26, 1875.

SIR: That branch of the industry of the country which is so largely committed to the care of this Department, presents a wide field for the exercise of learning and science, the ingenuity of practical experience, and the application of sound judgment; and I am pleased to believe that all these are at this moment greatly stimulated by the manifestly valuable results of the practical operations of agriculture which are constantly attained by their aid. Farmers and planters now realize that there is something else in this important work beyond the mere drudgery of sowing, reaping, and curing. Men of science and learning have turned their attention to the subject, and have so plainly and interestingly illustrated the nature of plants, the purposes to which they may be applied, their cultivation and products, as well as the injurious insects which depredate upon them, as to make the subject intelligible to the plainest comprehension; and it gives me great satisfaction to know that the work of this Department has kept pace with all the light which knowledge has cast upon the subject, and made it practically available to the agriculturists of the country.

The Department has taken the utmost pains to keep itself informed of all improvements or new discoveries which affect the interests of the farmer, whether it be in the kind or quality of seed, the best mode of its cultivation, the implements best adapted to the purpose, and the quality of soil and condition of climate congenial to its growth; and in the distribution of seeds the Department takes no risks as to the quality, always taking care that they shall be the very best of their kind, and adapting each to that locality where the product will be the most profitable, impressing upon the minds of all to whom they are sent that their community will be benefited by the result of their experiments. A correspondence with all parts of the country gives me the assurance of the wonderfully beneficial results which have been attained by this distribution of superior seeds. Farmers are now more than ever convinced that the success of their crops is in a great measure dependent upon the quality of the seed they sow. I do not hesitate to say that the crops of wheat and oats in this country have been increased many millions of

bushels by reason of the qualities of seeds distributed by this Department. The occupation of the farmer necessarily isolates him from the sources of information with regard to the progress and improvement which are always being made in his business; hence the inestimable value of the central point which this Department affords for the collection of facts and seeds, and their periodical distribution to those who have no other opportunity of obtaining them. And when we consider how the hopes and interests, and, indeed, the prosperity of our country, are dependent upon the success of agriculture, it is not wonderful that Congress should exercise a guardian care over it.

During the past year, a most destructive dispensation of grasshoppers was visited upon several of our Western States—Missouri, Minnesota, Kansas, and Nebraska, and, to some extent, Colorado and Dakota. In many places, the destruction of all vegetable life was total, threatening not only the existence of the population for the time being, but depriving them of all hope of the means of planting for the next season, the possible result of which was the depopulation of the whole country thus afflicted. But Congress wisely interposed, and through the instrumentality of the Quartermaster's Department of the Army supplied the absolute necessities of the people, and through this Department made provision for a supply of seed for the coming year by an appropriation of $30,000. I cannot adequately express the idea of the benefit and encouragement which were thus bestowed upon a people who were almost left without hope. A correspondent, in acknowledging the receipt of seed sent him, says: "The seed is most acceptable, for it relieves me from a state of hopelessness; but it cannot do me half as much good as it does to know that we have a Government that cares for her distressed people."

The repeal of what is mistakenly called the "franking privilege" has materially disturbed the operations of this Department for the past three years. It is, in my judgment, one of the defects in the organization of our Government that the people are not sufficiently conversant and intimately connected with its political operations. The repeal of the law, which rendered it necessary for members of Congress to send, free of charge, through the mails, seeds, letters, and documents, while it relieves them from an onerous labor which it is their duty to perform, deprives the constituent of a knowledge of the operations of the Government which he ought to have, and serves to alienate him in a measure from the institutions of his country. It takes from him the impression that he has a representative here who cares for his wants and necessities. While this Department under existing laws has the right to "frank" seeds and documents, and has nothing more to desire on that point, I have constant occasion to know and appreciate the importance that the same duty should devolve upon the representative in Congress. As the law now is, the representative after the meeting of the next Congress will have no right to communicate with his constituent but at his own

expense. It is because the right to frank does not belong to the representative that the reports of this Department have not been printed in the usual numbers for the last three years. If it be the pleasure of Congress to make the usual appropriation for the purchase and distribution of seeds and documents, and make no appropriation for their distribution by members of Congress, then the present clerical force of this Department must be increased by at least six clerks. With the present force of the Department, the work could not be done; nor with any force could it be so well done as by the representative, because of his superior knowledge of the individuals to whom seeds and documents may be most profitably sent. In the interest of this Department, I trust that the annual appropriations for seeds may be continued; that its annual reports may be fully published; and that the representative may be allowed to choose to whom they may be sent.

There is, perhaps, no one subject of agricultural production in which I have taken more interest than in that which relates to fibrous plants, especially ramie and jute. These have been brought into notice within the last four years through the influence of this Department; and now they are about to assume an importance which is only beginning to be known. Both these plants will grow successfully in all our Southern States, and especially in California. The impediment heretofore to their production has been the difficulty of separating the fiber from the gummy principle and green covering of the plants. But this problem, it is believed, has been now solved by the invention of machinery which, by the aid of certain acids, separates the fiber perfectly and economically. The ramie is a native of India and China, where the work of separating the fiber is done by hand at a cost of $150 per ton. The latest patentee of a machine for separating the fiber claims that the cost of separating it will not exceed $30 per ton. It is a beautiful and lustrous staple, in strength and brilliancy almost equal to silk; in fact, most of the dress-goods made to imitate silk-fabrics are made in part of ramie, and its value now in England is about £75, or $375, per ton; and it is said that in California 1,200 pounds of this fiber may be produced on one acre. If these anticipations be realized, of which there is now a reasonable hope, the country may anticipate the prosecution of a new, useful, and profitable industry. Jute produces a fiber of a coarser quality, but admirably adapted to cordage and bagging, and, because of its length and strength, greatly superior to either flax or hemp.

The Statistical Division of the Department has with industry and energy responded to the usual requirements of Congress, agricultural associations, and commercial boards, and to the necessities of international exchanges of agricultural statistics, in addition to current crop-reports and other local statistical investigation. The estimates, as a rule, have been strikingly verified, especially as to the principal crops of the older and more settled States. The resources of the Department have not been adequate to a full and accurate showing of the wonder-

fully rapid progress of the new and more distant States and Territories. The estimate of the cotton-crop of 1874, 3,800,000 bales, which was declared ten months ago by commercial authorities to be half a million bales too low, has been proved by the cotton-movements of the year to be within a few thousand bales of the actual crop.

This division will prepare a series of outline-maps, diagrams, and charts, to illustrate the changes in production and the geographical distribution of the principal crops, for the National Centennial Exhibition; and the Statistician will present a statistical report of the agricultural progress of the past century.

The attention of Congress is called to the proposed organization of this division as indicated in the schedule of annual estimates. This division of the Department has about five thousand regular, appointed correspondents. I know of no branch of the public service in which so much is accomplished with so small an expenditure. It is literally true that nine-tenths of the labor performed is gratuitous, that of our correspondents being entirely uncompensated, except by the reports of the Department and seeds sent them for experiment.

The operations of the Horticultural Division of the Department consist largely in the propagation and distribution of economic plants. Encouraging returns are received relative to the growth and adaptability of the Chinese tea-plant over a very large area of this country. These indications tend to increase the probability that at no distant day it will be deemed expedient to attempt the cultivation of this plant as an article of commerce, and even now as an aid to domestic economy. The arboretum yearly increases in the number of plants and interest in their growth. Within the past year over two hundred species and varieties of willow have been set out in permanent locations. The character and grouping of the trees will yearly become more decided, and develop the landscape effect of the original design. Time is an essential element in this, which can only be partially accelerated by the varied operations of careful culture.

The Chemical Division is doing much valuable work. The laboratory is in a good condition, and fairly stocked with chemicals and apparatus, and altogether in good working order. Investigations have been prosecuted upon various subjects which pertain to the interests of agriculture, among which are: The proximate composition of two varieties of sugar-corn; the influence of caustic magnesia in lime produced by calcination of magnesian limestone upon so-called lime-soils; the influence of arsenical compounds, when present in or applied to soils, upon vegetation; and the influence of illuminating-gas upon vegetation—all of which are practical subjects of great interest to the agriculturist. The analytical results of the first investigation will be found in the monthly report of April of this year. That of the analysis of magnesian limestone, and observations upon the action of lime produced from them upon certain lime-soils, prove quite satisfactorily that, while magnesian lime may be

applied with impunity to clay-soils, it cannot be applied to other soils except in dry seasons, and that even then it is detrimental, from the fact that the action continues through more than one season. The investigation upon the influence of arsenical compounds proved of great interest from the fact that arsenic has been so extensively used throughout the country, in the form of Paris green, for the destruction of noxious and injurious insects. It is found that although arsenic seems to exercise a destructive physiological influence upon the roots of plants with which it comes in contact, yet, after complete maturation, no trace of this element can be found within the tissues of the plant. Small quantities, however, may be applied to the soil without producing any physiological effect or deteriorating the growth of the plant. The investigation with regard to illuminating-gas results in the conclusion that two per cent. of it continually present in the atmosphere will produce the death of the plant.

Inquiries are constantly made from all parts of the country on chemical subjects, most of them pertaining to agriculture, but many of them asking for analyses of minerals and other substances which have no connection with it. The former are carefully attended to, while the Department uniformly declines to investigate any subject which is not of interest to the agriculturist.

The general awakening of interest in agricultural subjects has induced a considerable correspondence with the Botanical Division. Information of a practical character respecting the nature, properties, and uses of different kinds of plants has been sought for by correspondents from all parts of the country, and the desired information has been communicated. The herbarium continues to be improved and enlarged to an extent which will require additional conveniences, first, by the purchase of a collection of over 400 species of marine algæ; secondly, by the purchase of a valuable collection of 1,500 species of Swedish plants; thirdly, by a collection of 300 species of European mosses, donated to the Smithsonian Institution, by Dr. August Gatlinger, of Nashville, Tenn.; and, fourthly, by several small but valuable contributions of American plants from various sources, especially that from the expedition of Lieutenant Wheeler in 1874.

During the year, quite extensive distributions of duplicate plants have been made, chiefly as follows: To Massachusetts Agricultural College; Cornell University, New York; Michigan University; Chicago Academy of Sciences; Illinois Wesleyan University; the Female College at Bordentown, N. J.; the Steubenville Seminary, Steubenville, Ohio; Monmouth College, Warren County, Illinois; Swartmore College, Pennsylvania; Northwestern University, Evanston, Ill.; Wesleyan University, Middletown, Conn.; Wellesley Female College, Wellesley, Mass.; Wheaton Female Seminary, Norton, Mass.

This division has been making preparation to exhibit specimens of all the forest-trees of the country at the approaching Centennial.

The correspondence with the Entomological Division has been much increased during the past season, mainly by the wide-spread devastation of the grasshopper in the Western States and the rapid advance of the Colorado beetle in the East into new territory where the latter insect was before comparatively unknown. A fine series of beetles, butterflies, and wild bees has been added to the cabinet of entomology by Lieutenant Wheeler, through the Smithsonian Institution, collected west of the one hundredth parallel; and other collections have been received. The work of making perfect *fac-similes* of the fruits and vegetables of our country has steadily progressed; and the value of the collection for the practical study of pomology is much appreciated. A catalogue of these models has been commenced, which will much facilitate their study.

Preparation is being made in this division for a collection at the International Exhibition at Philadelphia, which will embrace models of fruits and vegetables grown in the United States; and a collection of grains, cereals, seeds, nuts, animal and vegetable fibers, and the manufactures, such as wools, silks, ramie, cotton, flax, hemp, jute, &c. In the ornithological and natural-history collection it is proposed to show such of our native birds and animals as are peculiarly beneficial and injurious; the different varieties of our gallinaceous birds in their true breeds, together with the new varieties recently introduced. In entomology, it is proposed to show a collection of beneficial and injurious insects, arranged together with a complete set of engravings of the most common destructive and useful insects of the country.

The library of the Department has been more largely increased during the past year than in any that preceded it, by the purchase of a few valuable works, but more particularly by the contributions of foreign countries and societies.

The Microscopic Division of the Department has been engaged during the past year principally in original investigations relating to animal and vegetable diseases of fungoid origin. Pear-tree and apple-tree blight has received special attention, and many microscopic observations have been made to ascertain whether the growth of parasitic fungi on plants is the cause or the result of the blight. Cranberry-rot, grape-rot, orange-tree blight, and hawthorn-blight have also been considered, and experiments made to ascertain their causes and discover remedies for their cure. It is believed that new facts have been developed from the investigation of these diseases which will lead to a more intelligent and successful treatment of them.

Many of the grape-growers of New Jersey have suffered severely from the rot of the grape. All investigations on this subject have been confined to specimens sent to the Department, the results of which, when sufficiently advanced, are published in the monthly and annual reports of the Department. The orange-cultivators of Florida have suffered severely from a new form of disease, which blackens the surface of a large portion of the fruit, and blights the branches, causing them to decay. This subject will occupy the attention of the Microscopist.

A large collection of American species of fungi of the order *Agaricini* has been made for the purpose of making known more generally the distinguishing characteristics of those which are edible and such as are poisonous. Since many thousand dollars are expended annually in the United States for the purchase of imported compounds of edible mushrooms, it is deemed important to prepare and publish such information as may lead to a scientific cultivation of all the edible species in this country. Considerable time has been devoted to the collection of leading types of other families of parisitic fungi destructive to cultivated plants, several hundreds of which have been carefully and artistically drawn in natural colors, the species having been fully identified and the names given by high authority in this country and Europe, and are intended for exhibition at the approaching Centennial at Philadelphia.

A series of experiments has also been conducted with special reference to antiferments, with the view of discovering the best methods of preserving specimen fruits and foliage in their natural colors, by which new and successful results have been obtained.

The accompanying tabular statement shows the quantities and kind of seed distributed by the Department, under the general appropriation, from July 1, 1874, to June 30, 1875, inclusive; also, the amount issued under the special appropriation "to the sufferers by grasshopper ravages; all classed under their respective heads.

The past year has been one of unusual activity in the Seed Division, and the work accomplished has been nearly double that of the previous year. To make a distribution of so large an amount of seeds in the proper season, was a work of considerable magnitude, and required the best efforts of every employé of this division, and which, I am pleased to say, was accomplished in a very satisfactory manner. The want of room to employ more force was a difficulty to be encountered, and the expedient resorted to under the circumstances was to add two hours to the working-time of each day during the months of February, March, and April, which was done with satisfactory results. All this extra work was caused by the special appropriation for the benefit of those States which suffered by the ravages of the grasshoppers. To furnish them with such seeds as were most needed was the desire of the Department; and it was soon ascertained, by the large number of letters received daily, that vegetable-seed was the kind most desired. Accordingly the Department made arrangements to procure large quantities of vegetable-seed of the best quality, and the kinds most desired and best suited for immediate use. And I take this opportunity to say that some of our seedsmen showed a very generous spirit by offering to furnish the Department, for this purpose, the very best quality of seeds at greatly-reduced rates, which was availed of. The manner in which these seeds were distributed was principally through members of Congress in their respective States, boards of relief, and individual application, thereby reaching all classes who were in want; and, as far as I know,

not one applicant was refused out of the thousands who made application.

It will be seen from the tabular statement, that, in addition to the large amount of vegetable seeds, other kinds have been distributed, such as wheat, oats, rye, corn, field-pease, sugar-beet, tobacco, &c. This does not, however, include the wheat bought by the Department and distributed by the governor of Minnesota, which, if added to our distribution, would increase it largely. The value of the vegetable seeds alone which were distributed to the grasshopper districts, at five cents a paper, (and that is a very low estimate,) would amount to over $35,000, showing conclusively that, by proper management and economy, the work was done more cheaply by the Government than it could have been done by individuals appointed for the purpose. Our general distribution embraces all kinds of seeds of known or reputed value to the American agriculturists. These seeds have been selected, in this and other countries, with great care, and distributed through the various agencies adopted by the Department for that purpose.

How far the Department has been successful in this respect it is only necessary to glance at the many reports received testifying to the good quality of the seeds. In nearly all cases they report that the Department seeds are far superior to the old varieties grown in their respective districts; and these reports are not confined to any one section of country or to one class of seeds, but are from all parts of the United States and embrace all kinds of seeds, showing how much good can be and is being done through this Department.

By referring to the tabular statement it will be seen that our general distribution has exceeded that of last year by over two hundred thousand packages, making the largest distribution in any one year since the organization of the Department.

The great want of the seed division is *more room.* During the past summer a structure has been erected which will give temporary relief in stowing away the grain and other seeds until needed for distribution.

This division is working very harmoniously in all its branches. A regular account is kept of all seeds bought by the Department, from whom purchased, and the cost of the same, and all materials used. In the distribution everything is charged to its respective account kept for that purpose, and any information in regard to the kinds of seeds sent, to whom, &c., can be readily obtained.

Tabular statement showing the quantity and kind of seed issued from the Department of Agriculture under the general appropriation, from July 1, 1874, to June 30, 1875, inclusive; also, amount issued under special appropriation to the sufferers by grasshopper ravages.

Description of seed.	Varieties.	Senators and members.	Agricultural societies.	Statistical correspondents.	Miscellaneous.	Grasshopper ravages.	Total.
Vegetable................papers..	278	234, 165	108, 965	92, 100	514, 839	703, 980	1, 654, 058
Flower......................do....	227	138, 158	215	20	199, 567	....	337, 960
Herbs.......................do....	10	66	....	....	100	....	166
Tree........................do....	28	141	20	....	2, 902	494	3, 557
FIELD-SEEDS.							
Wheat..................quarts..	5	13, 712	22, 220	12, 536	4, 903	312	53, 683
Oats........................do....	6	8, 738	24, 602	7, 988	5, 608	7, 544	54, 480
Barley......................do....	2	1, 862	2, 334	1, 206	865	318	6, 585
Rye..............................	1	5, 709	....	4, 642	1, 026	38	11, 415
Buckwheat.................do....	1	110	8	5, 174	544	78	5, 914
Corn........................do....	3	644	1, 122	1, 986	1, 430	209	5, 391
Pease.......................do....	1	816	52	....	199	37	1, 104
Clover......................do....	3	1, 720	1, 190	2	1, 516	359	4, 787
Grass.......................do....	4	4, 265	1, 310	4, 322	3, 101	678	13, 676
Sugar-beet.................do....	3	872	2, 272	2	194	119	3, 459
Mangel-wurzel.............do....	2	800	1, 666	....	184	41	2, 691
Rice........................do....	1	24	....	....	18	....	42
Sorghum...................do....	1	44	....	....	286	159	489
Tobacco................papers..	6	47, 028	6	30	6, 379	2, 620	56, 063
Opium poppy..............do....	1	50	....	....	272	....	322
Osage orange.........half pints..	1	3	....	....	24	4	31
Millet....................quarts..	1	38	....	....	32	....	70
Broom-corn................do....	1	10	....	....	14	....	24
Rape.................half pints..	1	8	....	....	6	....	14
TEXTILES.							
Cotton..................quarts..	2	1, 193	802	....	1, 074	26	3, 095
Jute........................do....	1	134	....	....	85	....	219
Hemp.......................do....	1	69	4	....	1, 700	....	1, 773
Flax........................do....	1	2	....	....	6	....	8
Ramie..................papers..	1	144	....	....	312	....	456
Grand total..................	......	460, 525	166, 788	130, 008	747, 186	717, 025	2, 221, 532

In the fiscal division of the Department the books of accounts are kept with the utmost accuracy, exhibiting all its pecuniary transactions in the most minute detail.

The following table exhibits in a condensed form the appropriations made by Congress for this Department, the disbursements, and the

balance to be covered into the United States Treasury, for the fiscal year ending June 30, 1875:

Title of appropriation.	Amount appropriated.	Amount disbursed.	Amount unexpended.
Salaries	$77,180 00	$77,127 60	$52 40
Collecting statistics	15,000 00	12,047 56	2,952 44
Purchase and distribution of seeds	65,000 00	64,719 83	280 17
Furniture, cases, and repairs	4,200 00	4,013 40	186 60
Experimental garden	8,000 00	8,000 00	....
Museum and herbarium	4,500 00	2,434 31	2,065 69
Laboratory	1,300 00	1,300 00	....
Library	1,500 00	1,087 30	412 70
Contingent expenses	12,600 00	10,330 46	2,269 54
Improvement of grounds	16,100 00	16,023 45	76 55
Postage	52,000 00	42,673 00	9,227 00
Printing and binding	20,000 00	16,973 12	3,026 88
Publishing reports of 1872 and 1873	50,000 00	49,561 91	438 09
Special distribution of seeds to sufferers from grasshopper ravages	30,000 00	30,000 00	....
Total	357,380 00	336,291 94	21,088 06

The amount to be covered into the Treasury will be slightly reduced by obligations incurred by the Department during the last fiscal year that are yet unsettled.

My experience in the past four years teaches me that the people of the country estimate highly the beneficial influence which the operations of this Department exert upon its agricultural interests, and prompts me to say that any action which Congress may take to increase its usefulness will be highly acceptable. I speak with the more confidence on this subject from the intimate and extensive correspondence of the Department, where there are received from two hundred to four thousand letters every day, the larger number being in those seasons when the distributions are made of seeds and reports, the demand for the latter always exceeding our means to supply.

Which is respectfully submitted by your obedient servant,

FRED'K WATTS.

To the PRESIDENT.

REPORT OF THE STATISTICIAN.

SIR: In presenting my eleventh annual report as Statistician of the Department of Agriculture, I deem it proper to refer to the organization and history of the branch of public service placed under my direction, for the purpose of showing what has been accomplished by the use of small means, as well as the inadequacy of the provision for work imperatively demanded for the public welfare.

This division was established in 1863, in the year following that of the organization of the Department, by the creation of the office of Statistician and the appropriation of $20,000 for purposes of statistical investigation and compilation. The position was filled by the appointment of Lewis Bollman, of Indiana, as Statistician, who was charged with the collection of crop-reports and current general statistics, and with the editing of the monthly report, a publication designed to include the gist of current crop-returns and such other data as required prompt publicity.

In 1866 the annual report was transferred to this division, and its editor, the undersigned, was appointed Statistician, and has since discharged the increased duties of this consolidation, establishing the division of statistics and of publication, which now combines with the crop-reporting system and general investigation the revision and issue of the reports and publications.

The agricultural report of the Patent-Office, which was published a few years prior to 1847 in connection with the annual mechanical report, became at that date a separate publication, which was continued as an annual until the organization of the Department of Agriculture, the last issue being that of 1861, under the auspices of the agricultural division of the Patent-Office. The annual edition had been increased from a few thousand to two hundred thousand. The new (or Department) series, has had still larger issues, varying from 200,000 to 275,000 copies per annum, until the repeal of the franking privilege interfered with their distribution. The recent reports have not been published promptly, on account of the differing views of the Senate and House relative to their distribution, the House usually voting to order 200,000 to 300,000 copies for free delivery, and the Senate desiring to limit franking and inclining to the English plan of sale at cost of printing.

It is susceptible of abundant proof that these volumes have greatly stimulated agricultural thought, encouraged the adoption of advanced processes, and excited a taste for agricultural reading, especially in new and poor settlements, in which they have proved a pioneer in all that pertains to agricultural progress. They have even gone in advance of the issues of the agricultural press, and created a demand for rural literature. They are more sought, according to the constant testimony of Congressmen, than any other public document, and are carefully husbanded and distributed by members with farming constituencies, while members representing cities now very generally make exchanges further to accommodate the constituents of the rural districts.

The function of the division of statistics is the collection of the current facts of agriculture in the United States and the compilation of such foreign statistics as may serve, by comparison and suggestion, to advance the interests of rural economy in this country. It involves an

organization of a corps of reporters, consisting of a chief and three assistants in each county, charged with the duty of responding monthly to systematic inquiries concerning the condition of growing crops, the area planted, rate of ultimate yield, the prevailing home-prices of products, the condition and comparative numbers of farm-animals, and other points of general interest. Circulars upon special subjects of local importance are occasionally sent; and special informatian from individual reporters is often sought, generally with prompt and satisfactory results.

These reporters are selected for their known intelligence and judgment, and the aid of agricultural societies, or, in their absence, of the Representative in Congress, is invoked in their selection, if suitable persons are not known to the officers of the Department. They are selected with reference to *fitness*, and their political views are usually unknown. Their duties are performed gratuitously, in a spirit of self-sacrifice for the public good, and with an ardent desire to co-operate with the Department for general as well as local progress in agriculture. They are undoubtedly more efficient than a force of mere stipendiaries, and are entitled to grateful recognition of their valuable services. It is a subject of regret that the Department has been unable to supply its statistical corps promptly with the annual reports which they help to make and on which many of their comparisons are based.

The translation and utilization of foreign statistical matter, and the preparation of original statistics for foreign exchange, are important features of the regular work of this division. The official statistics of States, of boards of trade, of railroads, of industrial associations, and all attainable data tending to illustrate production, distribution, and manufacture, are made available, so far as clerical facilities permit.

The furnishing of statistical statements for committees and members of Congress, boards of trade, and agricultural editors and authors, increases materially the work of the division. Added to these duties, the investigations required for original and practical papers for the monthly, annual, and special reports, the revision of matter prepared for publication, the preparation of illustrations, &c., demand service for which a singularly meager appropriation is quite inadequate, though other divisions of the Department are laid under contribution for such clerical aid as can properly be spared. The smallest State appropriation in aid of agricultural investigation is rarely less than the largest provision made for agricultural statistics of this Department for thirty-eight States and ten Territories. That results of comparative importance are obtained can be only due to the remarkable facilities of the Department in its control of an intelligent and faithful body of statistical reporters, whose combined service, freely rendered, is tenfold greater than the clerical and other service paid from appropriations.

More than nine-tenths of all this service is gratuitous. None of the ordinary work of the correspondent, who is often a farmer with a national reputation as a rural economist and man of broad views and general culture, is paid for; the work of the editor of the annual has been entirely unremunerated for ten years, and much of the matter for the several reports is furnished without cost. From $150,000 to $200,000 per annum is thus made a gratuity to the Government by ruralists of public spirit, who wish to advance the interests of producers and consumers, and save both classes from the jaws of the sharks that thrive on false statements concerning crop-production. As these classes comprise more than three-fourths of the people of the country, they have a right to demand protection of their interests.

The farmers, as a class, have usually been, by reason of their isolation

and retiring demeanor, as well as from their habit of independence and aversion to asking even their rights of the Government, almost entirely disregarded in its annual recognition of class interests. And yet those interests are, and must ever be, aided by legislation in some form and degree. Except in eras of spasmodic and violent economy, an appropriation of five millions annually for rivers and harbors fails to excite a passing criticism; and a subsidy of millions to foreign mail-steamers, ostensibly in aid of commerce, scarcely raises a ripple on the sea of journalism, except when diverted to individual pockets. Commerce has probably enjoyed the benefit of a thousand dollars for every dollar similarly appropriated in aid of agriculture. Even in the matter of statistical investigation a similar disproportion appears. With half the people engaged in agriculture, less space is occupied in the last census reports in the returns of agriculture than in those of manufactures, which occupy the labor of only half as many people; and of 2,326 pages in those reports but 300 are occupied with agriculture. A well-equipped bureau, with two or three score of workers, is provided, in the interest of commerce, for the presentation of customs statistics and coincident commercial matters; and the Signal Service, in the interest of domestic and foreign commerce, with only a shadow of appearance of aid to agriculture, may be richly worth the half-million or million that it costs. If these expenditures in original statistical record and investigation for the information of middlemen are legitimate and desirable, may not the dole of a paltry pittance, say $10,000, $15,000 per annum, for the purposes of record of and investigation in agricultural statistics be wisely and profitably increased?

A more than Egyptian economy is required of this division the coming year; in addition to the task of making bricks without straw, it is required to dispense with clay; having not a dollar of allowance for collecting statistics, for investigation of any kind, or for drawings or engravings, or other material for reports, the entire appropriation being only $11,800, less than enough to pay the present clerical force absolutely required for routine work. It can only collate and record data gathered absolutely without cost, and the appropriation for printing will be so far exhausted by December, 1876, as to require the discontinuance of the monthly at that date, unless further provision shall be made.

CROP ESTIMATES FOR THE YEAR.

The year 1875 was marked by a wonderful increase in the area of maize. The area of 41,036,900 acres, as estimated, was increased to 44,841,000. The average yield of 1874 was very low, 20.7 bushels, and the price consequently very high, 64.7 cents per bushel. The incentive of price, and the teachings of bitter experience in the southern lack of a corn supply, increased the breadth almost 10 per cent. The result is an unprecedented volume of production, the estimates of the year aggregating 1,321,000,000 bushels, fully 10 per cent. above the record of any previous year. The rate of yield was advanced to 29.4 bushels, while the price dropped to 42 cents. To an inexperienced observer it would seem a problematical statement that with an increase of nearly 500,000,000 bushels the aggregate value should be advanced only from $550,043,000 to $555,445,000, but it is exactly in accordance with former experience of the effect of large production upon value. An increase in quantity of 56 per cent. advanced the aggregate value but 1 per cent.

The area of wheat was increased more than a million acres, but the average yield is reduced 1.3 bushels per acre. The aggregate quantity

appears to be less by about 16,000,000 bushels, while the aggregate value is about three and a half million dollars more than in 1874.

Rye increased in quantity and area, the rate of yield being about the same.

The oats-crop was large, estimated at 354,000,000 bushels against 240,000,000 last year, the price naturally declining from 52 to 36.5 cents, making the total value only about 3 per cent. more than that of the small crop of 1874.

The crop of barley appears to have been increased from 32,000,000 to 36,000,000 bushels, the value of the two crops being nearly equal.

The potato-crop was extraordinary. Exclusive of sweet-potatoes the estimate is 166,000,000 bushels, the area increasing 200,000 acres, or 15 per cent., and the yield advancing from 67 to 110 bushels per acre. The result was a price too low in many places to pay for cultivation and marketing, the total value being less for the large crop than for the small one, or 38.9 cents against 67.7.

The cotton-crop increased about 20 per cent., the average price declining from 14.5 to 12.8 cents, or 12 per cent. from the average price of the previous crop.

A.—*Table showing the product of each principal crop of the several States named, the yield per acre, the total acreage, the average price in each State, and the value of each crop for* 1875.

Products.	Quantity produced in 1875.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
MAINE.					
Indian corn .... bushels..	1,300,000	30.5	42,622	$0 96	$1,248,000
Wheat .... do....	282,000	14	20,142	1 64	462,480
Rye .... do....	33,000	16.7	1,976	1 18	38,940
Oats .... do....	2,400,000	28	85,714	56	1,344,000
Barley .... do....	670,000	21	31,904	89	596,300
Buckwheat .... do....	410,000	23.5	17,446	70	287,000
Potatoes .... do....	5,810,000	107	54,299	42	2,440,200
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	1,240,000	0.95	1,305,263	10 85	13,454,000
Total	....	....	1,559,366	....	19,870,920
NEW HAMPSHIRE.					
Indian corn .... bushels..	1,650,000	38	43,421	94	1,551,000
Wheat .... do....	198,000	17	11,647	1 64	324,720
Rye .... do....	45,000	18.5	2,432	1 11	49,950
Oats .... do....	1,175,000	38.6	30,440	57	669,750
Barley .... do....	102,000	25.1	4,063	1 02	104,040
Buckwheat .... do....	95,000	20	4,750	78	74,100
Potatoes .... do....	4,200,000	133	31,578	42	1,764,000
Tobacco .... pounds..	460,000	1,600	287	15	69,000
Hay .... tons..	780,000	0.95	821,052	12 81	9,991,800
Total	....	....	949,670	....	14,598,360
VERMONT.					
Indian corn .... bushels..	1,720,000	37	46,486	94	1,616,800
Wheat .... do....	430,000	17.5	24,571	1 55	666,500
Rye .... do....	78,000	19	4,105	1 01	78,780
Oats .... do....	4,560,000	39	116,923	50	2,280,000
Barley .... do....	116,000	29.4	3,945	91	105,560
Buckwheat .... do....	380,000	21.3	17,840	71	269,800
Potatoes .... do....	5,850,000	155	37,741	33	1,930,500
Tobacco .... pounds..	250,000	1,500	166	16	40,000
Hay .... tons..	1,010,000	0.95	1,063,157	10 30	10,403,000
Total	....	....	1,314,934	....	17,390,940

A.—*Table showing the product of each principal crop, &c., for* 1875—Continued.

Products.	Quantity produced in 1875.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
MASSACHUSETTS.					
Indian corn........................bushels..	1, 620, 000	37	43, 783	$0 95	$1, 539, 000
Wheat..................................do....	36, 500	16	2, 293	1 37	50, 005
Rye......................................do....	290, 000	17	17, 058	1 07	310, 300
Oats ....do....	760, 000	36	21, 111	61	463, 600
Barley ....do....	130, 000	24. 5	5, 306	1, 09	141, 700
Buckwheat ....do....	50, 000	11	4, 545	62	31, 000
Potatoes ....do....	3, 500, 000	150	23, 333	52	1, 820, 000
Tobacco...............................pounds..	8, 500, 000	1, 350	6, 296	19	1, 615, 000
Hay ....tons..	580, 000	1	580, 000	20 89	12, 116, 200
Total..	....	....	703, 725	....	18, 086, 805
RHODE ISLAND.					
Indian corn........................bushels..	290, 000	27. 5	10, 545	1 10	319, 000
Wheat..................................do....	....	....	....	....	....
Rye......................................do....	19, 000	15	1, 266	1 20	22, 800
Oats ....do....	140, 000	30	4, 666	60	84, 000
Barley ....do....	27, 000	20	1, 350	1 00	27, 000
Buckwheat ....do....	....	....	....	....	....
Potatoes ....do....	690, 000	130	5, 307	50	345, 000
Tobacco...............................pounds..	....	....	....	....	....
Hay ....tons..	80, 000	0. 95	84, 210	23 00	1, 840, 000
Total..	....	....	107, 344	....	2, 637, 800
CONNECTICUT.					
Indian corn........................bushels..	1, 775, 000	29	61, 206	1 00	1, 775, 000
Wheat..................................do....	39, 500	16	2, 468	1 33	52, 535
Rye......................................do....	345, 000	15	23, 000	1 10	379, 500
Oats ....do....	1, 090, 000	28	38, 928	61	664, 900
Barley ....do....	23, 600	20	1, 180	1 12	26, 432
Buckwheat ....do....	135, 000	17. 5	7, 714	95	128, 250
Potatoes ....do....	2, 860, 000	108	26, 481	56	1, 601, 600
Tobacco...............................pounds..	9, 900, 000	1, 500	6, 600	22	2, 178, 000
Hay ....tons..	570, 000	1. 05	542, 857	21 75	12, 397, 500
Total..	....	....	710, 434	....	19, 203, 717
NEW YORK.					
Indian corn........................bushels..	19, 750, 000	34	580, 882	74	14, 615, 000
Wheat..................................do....	5, 200, 000	8	650, 000	1 31	6, 812, 000
Rye......................................do....	2, 450, 000	10	245, 000	86	2, 107, 000
Oats ....do....	36, 500, 000	32	1, 140, 625	44	16, 060, 000
Barley..................................do....	7, 800, 000	18	433, 333	89	6, 942, 000
Buckwheat ....do....	3, 750, 000	16	234, 375	67	2, 512, 500
Potatoes ....do....	35, 000, 000	107	327, 102	36	12, 600, 000
Tobacco...............................pounds..	2, 750, 000	800	3, 437	11	302, 500
Hay ....tons..	4, 900, 000	1. 17	4, 188, 034	14 00	68, 600, 000
Total..	....	....	7, 802, 788	....	130, 551, 000
NEW JERSEY.					
Indian corn........................bushels..	9, 600, 000	41	234, 146	65	6, 240, 000
Wheat..................................do....	1, 900, 000	12	158, 333	1 36	2, 584, 000
Rye......................................do....	475, 000	12. 7	37, 401	89	422, 750
Oats ....do....	3, 850, 000	24	160, 416	48	1, 848, 000
Barley ....do....	....	....	....	....	....
Buckwheat ....do....	360, 000	17	21, 176	77	277, 200
Potatoes ....do....	4, 100, 000	82	50, 000	54	2, 214, 000
Tobacco...............................pounds..	....	....	....	....	....
Hay ....tons..	490, 000	1	490, 000	21 36	10, 466, 400
Total..	....	....	1, 151, 472	....	24, 052, 350

A.—*Table showing the product of each principal crop, &c., for* 1875—Continued.

Products.	Quantity produced in 1875.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
PENNSYLVANIA.					
Indian corn .... bushels..	44, 000, 000	40	1, 100, 000	$0 58	$25, 520, 000
Wheat .... do....	15, 200, 000	13. 8	1, 101, 449	1 29	19, 608, 000
Rye .... do....	3, 100, 000	13. 4	231, 343	85	2, 635, 000
Oats .... do....	32, 500, 000	30	1, 083, 333	41	13, 325, 000
Barley .... do....	520, 000	23	22, 608	1 02	530, 400
Buckwheat .... do....	2, 320, 000	20	116, 000	69	1, 600, 800
Potatoes .... do....	12, 250, 000	96	127, 604	42	5, 145, 000
Tobacco .... pounds..	16, 000, 000	1, 400	11, 428	10	1, 600, 000
Hay .... tons..	2, 400, 000	1. 10	2, 181, 818	17 12	41, 088, 000
Total	....	....	5, 975, 583	....	111, 052, 200
DELAWARE.					
Indian corn .... bushels..	3, 267, 000	26	125, 653	57	1, 862, 190
Wheat .... do....	745, 000	13. 5	55, 185	140	1, 043, 000
Rye .... do....	11, 100	13. 5	822	95	10, 545
Oats .... do....	430, 000	21	20, 476	43	184, 900
Barley .... do....	....	....	....	....	....
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	275, 000	75	3, 666	72	198, 000
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	36, 500	1. 20	30, 416	18 33	669, 045
Total	....	....	236, 218	....	3, 967, 680
MARYLAND.					
Indian corn .... bushels..	14, 200, 000	30	473, 333	55	7, 810, 000
Wheat .... do....	5, 100, 000	11	463, 636	1 27	6, 477, 000
Rye .... do....	310, 000	12. 3	25, 203	77	238, 700
Oats .... do....	3, 050, 000	20	152, 500	44	1, 342, 000
Barley .... do....	....	....	....	....	....
Buckwheat .... do...	72, 500	23. 3	3, 111	61	44, 225
Potatoes .... do....	1, 250, 000	72	17, 361	54	675, 000
Tobacco .... pounds..	22, 000, 000	675	32, 592	08. 3	1, 826, 000
Hay .... tons..	190, 000	1	190, 000	18 93	3, 596, 700
Total	....	....	1, 357, 736	....	22, 009, 625
VIRGINIA.					
Indian corn .... bushels..	21, 333, 000	22	969, 681	54	11, 519, 820
Wheat .... do....	6, 700, 000	8	837, 500	1 21	8, 107, 000
Rye .... do....	545, 000	9	60, 555	78	425, 100
Oats .... do....	5, 500, 000	15	366, 666	49	2, 695, 000
Barley .... do....	....	....	....	....	....
Buckwheat .... do....	50, 600	17. 5	2, 891	67	33, 902
Potatoes .... do....	1, 210, 000	82	14, 756	52	629, 200
Tobacco .... pounds..	57, 000, 000	630	90, 476	08. 5	4, 845, 000
Hay .... tons..	190, 000	1. 20	158, 333	16 53	3, 140, 700
Total	....	....	2, 500, 858	....	31, 395. 722
NORTH CAROLINA.					
Indian corn .... bushels..	22, 275, 000	15	1, 485, 000	60	13, 365, 000
Wheat .... do....	3, 050, 000	7. 5	406, 666	1 24	3, 782, 000
Rye .... do....	340, 000	9	37, 777	87	295, 800
Oats .... do....	3, 250, 000	13	250, 000	58	1, 885, 000
Barley .... do....	....	....	....	....	....
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	745, 000	85	8, 764	67	499, 150
Tobacco .... pounds..	14, 750, 000	500	29, 500	09. 7	1, 430, 750
Hay .... tons..	110, 000	1. 25	88, 000	12 51	1, 376, 100
Total	....	....	2, 305, 707	....	22, 633, 800

A.—*Table showing the product of each principal crop, &c., for* 1875—Continued.

Products.	Quantity produced in 1875.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
SOUTH CAROLINA.					
Indian corn .... bushels..	9, 240, 000	10. 2	905, 832	$1 00	$9, 240, 000
Wheat .... do....	750, 000	7	107, 142	1 70	1, 275, 000
Rye .... do....	40, 000	6. 5	6, 153	1 37	54, 800
Oats .... do....	858, 000	12. 5	68, 640	86	737, 880
Barley .... do....	....	....	....	....	....
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	102, 000	90	1, 133	1 01	103, 020
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	22, 500	1	22, 500	20 50	461, 250
Total	....	....	1, 111, 450	....	11, 871, 950
GEORGIA.					
Indian corn .... bushels..	20, 100, 000	10	2, 010, 000	86	17, 286, 000
Wheat .... do....	3, 050, 000	7. 5	406, 666	1 50	4, 575, 000
Rye .... do....	190, 000	6. 7	28, 358	1 49	283, 100
Oats .... do....	4, 100, 000	11	372, 727	89	3, 649, 000
Barley .... do....	15, 000	12	1, 250	1 78	26, 700
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	340, 000	68	5, 000	1 20	408, 000
Tobacco .... pounds..	1, 350, 000	550	2, 454	23. 7	319, 950
Hay .... tons..	22, 000	1. 40	15, 714	17 68	388, 960
Total	....	....	2, 842, 169	....	26, 936, 710
FLORIDA.					
Indian corn .... bushels..	2, 150, 000	10	215, 000	1 08	2, 322, 000
Wheat .... do....	....	....	....	....	....
Rye .... do....	....	....	....	....	....
Oats .... do....	123, 000	13	9, 461	1 05	129, 150
Barley .... do....	....	....	....	....	....
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	....	....	....	....	....
Tobacco .... pounds..	450, 000	750	600	25	112, 500
Hay .... tons..	....	....	....	....	....
Total	....	....	225, 061	....	2, 563, 650
ALABAMA.					
Indian corn .... bushels..	24, 500, 000	12. 6	1, 944, 444	75	18, 375, 000
Wheat .... do....	1, 190, 000	8. 5	140, 000	1 23	1, 463, 700
Rye .... do....	22, 000	10. 5	2, 095	1 52	33, 440
Oats .... do....	840, 000	14	60, 000	84	705, 600
Barley .... do....	....	....	....	....	....
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	155, 000	50	3, 100	1 22	189, 100
Tobacco .... pounds..	175, 000	465	376	25	43, 750
Hay .... tons..	22, 000	1. 30	16, 923	19 43	427, 460
Total	....	....	2, 166, 938	....	21, 238, 050
MISSISSIPPI.					
Indian corn .... bushels..	23, 220, 000	18	1, 290, 000	72	16, 718, 400
Wheat .... do....	420, 000	11	38, 181	1 51	634, 200
Rye .... do....	15, 500	11. 8	1, 313	1 42	22, 010
Oats .... do....	800, 000	18. 5	43, 243	89	712, 000
Barley .... do....	....	....	....	....	....
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	240, 000	75	3, 200	97	232, 800
Tobacco .... pounds..	112, 000	317	353	25	28, 000
Hay .... tons..	22, 000	1. 50	14, 666	17 00	374, 000
Total	....	....	1, 390, 956	....	18, 721, 410

A.—*Table showing the product of each principal crop, &c., for* 1875—Continued.

Products.	Quantity produced in 1875.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
LOUISIANA.					
Indian corn ....bushels..	7, 920, 000	15. 5	510, 967	$0 89	$7, 048, 800
Wheat ....do...	....	....	....	....	....
Rye ....do...	....	....	....	....	....
Oats ....do...	31, 500	14	2, 250	1 10	34, 650
Barley ....do...	....	....	....	....	....
Buckwheat ....do...	....	....	....	....	....
Potatoes ....do...	70, 000	75	933	1 10	77, 000
Tobacco..........pounds..	....	....	....	....	....
Hay..........tons..	15, 000	1. 50	10, 000	16 25	243, 750
Total..........	....	....	524, 150	....	7, 404, 200
TEXAS.					
Indian corn ....bushels..	31, 000, 000	20	1, 550, 000	83	25, 730, 000
Wheat..........do...	2, 510, 000	18	139, 444	1 27	3, 187, 700
Rye ....do...	52, 000	18. 1	2, 872	1 10	57, 200
Oats ....do...	1, 610, 000	32	50, 312	72	1, 159, 200
Barley ....do...	70, 000	30	2, 333	95	66, 500
Buckwheat ....do...	....	....	....	....	....
Potatoes ....do...	400, 000	100	4, 000	1 22	488, 000
Tobacco..........pounds..	135, 000	650	207	25	33, 750
Hay..........tons..	75, 000	1. 25	60, 000	12 50	937, 500
Total..........	....	....	1, 809, 168	....	31, 659, 850
ARKANSAS.					
Indian corn..........bushels..	19, 448, 000	30	648, 266	52	10, 112, 960
Wheat..........do...	1, 955, 000	12. 3	158, 943	1 05	2. 052, 750
Rye ....do...	62, 000	13. 7	4, 525	1 03	63, 860
Oats ....do...	940, 000	29	32, 413	58	545, 200
Barley ....do...	....	....	....	....	....
Buckwheat ....do...	....	....	....	....	....
Potatoes ....do...	270, 000	101	2, 673	79	213, 300
Tobacco..........pounds..	1, 250, 000	822	1, 520	12. 2	152, 500
Hay..........tons..	21, 600	1. 40	15, 428	16 30	352, 080
Total..........	....	....	863, 768	....	13, 492, 650
TENNESSEE.					
Indian corn ....bushels..	58, 000, 000	26. 5	2, 188, 679	41	23, 780, 000
Wheat..........do...	13, 130, 000	8. 5	1, 544, 705	1 01	13, 261, 300
Rye ....do...	260, 000	9. 4	27, 659	89	231, 400
Oats ....do...	4, 820, 000	18	267, 777	45	2, 169, 000
Barley ....do...	82, 000	19	4, 315	80	65, 600
Buckwheat ....do...	105, 000	16. 8	6, 250	75	78, 750
Potatoes ....do...	1, 100, 000	70	15, 714	56	616, 000
Tobacco..........pounds..	35, 000, 000	675	51, 852	7. 2	2, 520, 000
Hay..........tons..	145, 000	1. 36	106, 617	16 24	2, 354, 800
Total..........	....	....	4, 213, 568	....	45, 076, 850
WEST VIRGINIA.					
Indian corn..........bushels..	10, 560, 000	29. 1	362, 886	56	5, 913, 600
Wheat ....do...	2, 000, 000	6. 8	294, 117	1 38	2, 760, 000
Rye ....do...	265, 000	11. 5	23, 043	93	246, 450
Oats ....do...	2, 100, 000	21	100, 000	42	882, 000
Barley ....do...	48, 000	15	3, 200	75	36, 000
Buckwheat ....do...	80, 000	17	4, 705	82	65, 600
Potatoes ....do...	1, 150, 000	110	10, 454	51	586, 500
Tobacco..........pounds..	2, 240, 000	680	3, 294	10. 5	235, 200
Hay..........tons..	230, 000	1. 20	191, 666	13 74	3, 160, 200
Total..........	....	....	993, 365	....	13, 885, 550

A.—*Table showing the product of each principal crop, &c., for* 1875—Continued.

Products.	Quantity produced in 1875.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
KENTUCKY.					
Indian corn....bushels..	60, 200, 000	33. 3	1, 807, 807	$0 41	$24, 682, 000
Wheat....do....	7, 960, 000	10	796, 000	1 05	8, 358, 000
Rye....do....	1, 100, 000	11. 7	94, 017	91	1, 001, 000
Oats....do....	6, 200, 000	21	295, 238	46	2, 852, 000
Barley....do....	240, 000	20. 5	11, 707	90	216, 000
Buckwheat....do....	....	....	....	....	....
Potatoes....do....	1, 650, 000	98	16, 836	49	808, 500
Tobacco....pounds..	130, 000, 000	630	206, 349	06. 6	8, 580, 000
Hay....tons..	275, 000	1. 30	211, 538	14 25	3, 918, 750
Total....	....	....	3, 439, 492	....	50, 416, 250
OHIO.					
Indian corn....bushels..	95, 000, 000	34. 5	2, 753, 623	44	41, 800, 000
Wheat....do....	17, 500, 000	9. 5	1, 842, 105	1 09	19, 075, 000
Rye....do....	220, 000	10. 5	20, 952	76	167, 200
Oats....do....	23, 750, 000	27. 2	873, 161	36	8, 550, 000
Barley....do....	800, 000	18. 5	43, 243	90	720, 000
Buckwheat....do....	370, 000	15	24, 666	82	303, 400
Potatoes....do....	12, 700, 000	103	123, 300	36	4, 572, 000
Tobacco....pounds..	13, 500, 000	700	19, 285	06	810, 000
Hay....tons..	1, 900, 000	1. 10	1, 727, 282	12 97	24, 643, 000
Total....	....	....	7, 427, 617	....	100, 640, 600
MICHIGAN.					
Indian corn....bushels..	23, 600, 000	33	715, 151	61	14, 396, 000
Wheat....do....	16, 870, 000	13. 5	1, 249, 629	1 15	19, 400, 500
Rye....do....	275, 000	14. 1	19, 503	86	236, 500
Oats....do....	11, 500, 000	35	328, 571	43	4, 945, 000
Barley....do....	960, 000	20. 5	46, 829	92	883, 200
Buckwheat....do....	650, 000	18. 7	34, 759	69	448, 500
Potatoes....do....	10, 625, 000	125	85, 000	31	3, 293, 750
Tobacco....pounds..	....	....	....	....	....
Hay....tons..	1, 220, 000	1. 20	1, 016, 868	14 50	17, 690, 000
Total....	....	....	3, 496, 310	....	61, 293, 450
INDIANA.					
Indian corn....bushels..	95, 000, 000	34	2, 794, 117	39	37, 050, 000
Wheat....do....	17, 280, 000	9	1, 920, 000	97	16, 761, 600
Rye....do....	330, 000	12	27, 500	75	247, 500
Oats....do....	18, 000, 000	29	620, 689	33	5, 940, 000
Barley....do....	440, 000	17	25, 882	88	387, 200
Buckwheat....do....	170, 000	19	8, 947	95	161, 500
Potatoes....do....	5, 450, 000	104	42, 788	36	1, 962, 000
Tobacco....pounds..	12, 750, 000	500	25, 500	05. 5	701, 250
Hay....tons..	1, 050, 000	1. 30	807, 692	11 49	12, 064, 500
Total....	....	....	6, 273, 115	....	75, 275, 550
ILLINOIS.					
Indian corn....bushels..	280, 000, 000	34. 3	8, 163, 265	34	95, 200, 000
Wheat....do....	27, 300, 000	10. 5	2, 600, 000	91	24, 843, 000
Rye....do....	2, 600, 000	16. 5	157, 572	61	1, 586, 000
Oats....do....	75, 000, 000	33	2, 272, 727	28	21, 000, 000
Barley....do....	2, 900, 000	25. 6	113, 281	70	2, 030, 000
Buckwheat....do....	180, 000	15	12, 000	80	144, 000
Potatoes....do....	15, 200, 000	128	118, 750	32	4, 864, 000
Tobacco....pounds..	8, 000, 000	550	14, 545	05. 6	448, 000
Hay....tons..	3, 050, 000	1. 37	2, 226, 277	9 73	29, 676, 500
Total....	....	....	15, 678, 417	....	179, 791, 500

A.—*Table showing the product of each principal crop, &c., for* 1875—Continued.

Products.	Quantity produced in 1875.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
WISCONSIN.					
Indian corn .... bushels..	15, 200, 000	21	723, 809	$0 54	$8, 208, 000
Wheat .... do....	25, 200, 000	14	1, 800, 000	91	22, 932, 000
Rye .... do....	1, 340, 000	16. 5	81, 212	68	911, 200
Oats .... do....	26, 600, 000	38. 5	680, 000	33	8, 778, 000
Barley .... do....	2, 200, 000	31	70, 967	92	2, 024, 000
Buckwheat .... do....	275, 000	13	21, 153	79	217, 250
Potatoes .... do....	7, 600, 000	105	72, 380	29	2, 204, 000
Tobacco .... pounds..	2, 500, 000	560	4, 464	06	150, 000
Hay .... tons..	1, 420, 000	1. 35	1, 051, 851	9 53	13, 532, 600
Total	....	....	4, 505, 836	....	58, 957, 050
MINNESOTA.					
Indian corn .... bushels..	7, 340, 000	29. 2	251, 369	42	3, 082, 800
Wheat .... do....	27, 200, 000	17	1, 600, 000	86	23, 392, 000
Rye .... do....	150, 000	19. 5	7, 692	59	88, 500
Oats .... do....	13, 000, 000	35	371, 428	32	4, 160, 000
Barley .... do....	1, 120, 000	28	40, 000	76	851, 200
Buckwheat .... do....	49, 000	15	3, 266	76	37, 240
Patatoes .... do....	4, 500, 000	125	36, 000	29	1, 305, 000
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	857, 000	1. 35	634, 814	5 25	4, 499, 250
Total	....	....	2, 944, 569	....	37, 415, 990
IOWA.					
Indian corn .... bushels..	160, 000, 000	35	4, 571, 428	27	43, 200, 000
Wheat .... do....	29, 800, 000	9. 7	3, 072, 164	71	21, 158, 000
Rye .... do....	650, 000	18	36, 111	27	175, 500
Oats .... do....	28, 000, 000	37. 7	742, 705	24	6, 720, 000
Barley .... do....	6, 300, 000	22. 3	282, 511	53	3, 339, 000
Buckwheat .... do....	160, 000	19. 6	8, 163	77	123, 200
Potatoes .... do....	8, 700, 000	110	79, 090	24	2, 088, 000
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	1, 920, 000	1. 35	1, 422, 222	5 78	11, 097, 600
Total	....	....	10, 214, 394	....	87, 901, 300
MISSOURI.					
Indian corn .... bushels..	128, 000, 000	36. 6	3, 497, 267	28	35, 840, 000
Wheat .... do....	11, 160, 000	9	1, 240, 000	95	10, 602, 000
Rye .... do....	600, 000	13. 4	44, 776	68	408, 000
Oats .... do....	20, 500, 000	31. 6	648, 734	27	5, 535, 000
Barley .... do....	450, 000	19	23, 684	94	423, 000
Buckwheat .... do....	60, 000	17. 4	3, 448	65	39, 000
Potatoes .... do....	6, 300, 000	110	57, 272	37	2, 331, 000
Tobacco .... pounds..	40, 000, 000	850	47, 058	05. 7	2, 280, 000
Hay .... tons..	700, 000	1. 30	538, 461	10 28	7, 196, 000
Total	....	....	6, 100, 700	....	64, 654, 000
KANSAS.					
Indian corn .... bushels..	76, 700, 000	40	1, 917, 500	23	17, 641, 000
Wheat .... do....	12, 700, 000	17	747, 058	87	11, 049, 000
Rye .... do....	1, 380, 000	17. 5	78, 857	51	703, 800
Oats .... do....	9, 530, 000	33	288, 787	24	2, 287, 200
Barley .... do....	800, 000	21. 8	36, 697	57	456, 000
Buckwheat .... do....	240, 000	18. 5	12, 972	72	172, 800
Potatoes .... do....	4, 480, 000	112	40, 000	27	1, 209, 600
Tobacco .... pounds..	275, 000	670	410	07. 8	21, 450
Hay .... tons..	960, 000	1. 35	711, 111	3 04	2, 918, 400
Total	....	....	3, 833, 392	....	36, 459, 250

A—*Table showing the product of each principal crop, &c., for* 1875—Continued.

Products.	Quantity produced in 1875.	Average yeld per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total valuation.
NEBRASKA.					
Indian corn .... bushels..	28,000,000	40	700,000	$0 20	$5,600,000
Wheat .... do....	3,400,000	9.8	346,938	64	2,176,000
Rye .... do....	50,000	16	3,125	52	26,000
Oats .... do....	4,375,000	35	125,000	22	962,500
Barley .... do....	375,000	22.4	16,741	45	168,750
Buckwheat .... do....	85,000	21.5	3,953	75	63,750
Potatoes .... do....	1,950,000	130	15,000	19	370,500
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	350,000	1.40	250,000	3 65	1,277,500
Total	....	....	1,460,757	....	10,645,000
CALIFORNIA.					
Indian corn .... bushels..	1,500,000	36.3	41,322	1 07	1,605,000
Wheat .... do....	23,800,000	11	2,163,636	1 18	28,084,000
Rye .... do....	75,000	17.5	4,285	92	69,000
Oats .... do....	2,100,000	32	65,625	72	1,512,000
Barley .... do....	9,050,000	18	502,777	91	8,235,500
Buckwheat .... do....	35,000	25	1,400	1 50	52,500
Potatoes .... do....	3,500,000	120	29,166	94	3,290,000
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	690,000	1.40	492,857	16 59	11,447,100
Total	....	....	3,301,068	....	54,295,100
OREGON.					
Indian corn .... bushels..	96,000	26.5	3,622	91	87,360
Wheat .... do....	4,500,000	17.6	255,681	87	3,915,000
Rye .... do....	4,500	19.5	230	95	4,275
Oats .... do....	2,450,000	35	70,000	55	1,347,500
Barley .... do....	450,000	27	16,666	70	315,000
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	845,000	130	6,500	76	642,200
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	120,000	1.37	87,591	11 07	1,328,400
Total	....	....	440,290	....	7,639,735
NEVADA.					
Indian corn .... bushels..	15,000	29	517	1 08	16,200
Wheat .... do....	380,000	18	21,111	1 20	456,000
Rye .... do....	....	....	....	....	....
Oats .... do....	85,000	36	2,361	74	62,900
Barley .... do....	500,000	26.5	18,867	1 03	515,000
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	210,000	110	1,909	95	199,500
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	50,000	1.30	38,461	18 00	900,000
Total	....	....	83,226	....	2,149,600
THE TERRITORIES.					
Indian corn .... bushels..	1,500,000	26	57,692	1 02	1,530,000
Wheat .... do....	3,200,000	19.5	164,102	1 00	3,200,000
Rye .... do....	....	....	....	....	....
Oats .... do....	1,800,000	35	51,428	71	1,278,000
Barley .... do....	720,000	28.5	25,263	1 00	720,000
Buckwheat .... do....	....	....	....	....	....
Potatoes .... do....	1,600,000	135	11,851	69	1,104,000
Tobacco .... pounds..	....	....	....	....	....
Hay .... tons..	160,000	1.40	114,285	13 59	2,174,400
Total	....	....	424,621	....	10,006,400

B.—*Summary for each State showing the product, the area, and the value of each crop for* 1875.

States.	INDIAN CORN.			WHEAT.			RYE.		
	Bushels.	Acres.	Value.	Bushels.	Acres.	Value.	Bushels.	Acres.	Value.
Maine	1,300,000	42,622	$1,248,000	282,000	20,142	$462,480	33,000	1,976	$38,940
New Hampshire	1,650,000	43,421	1,551,000	198,000	11,647	324,720	45,000	2,432	49,950
Vermont	1,720,000	46,486	1,616,800	430,000	24,571	666,500	78,000	4,105	78,780
Massachusetts	1,620,000	43,783	1,539,000	36,500	2,293	50,005	290,000	17,058	310,300
Rhode Island	290,000	10,545	319,000	....	....	....	19,000	1,266	22,800
Connecticut	1,775,000	61,206	1,775,000	39,500	2,468	52,535	345,000	23,000	379,500
New York	19,750,000	580,882	14,615,000	5,200,000	650,000	6,812,000	2,450,000	245,000	2,107,000
New Jersey	9,600,000	234,146	6,240,000	1,900,000	158,333	2,584,000	475,000	37,401	422,750
Pennsylvania	44,000,000	1,100,000	25,520,000	15,200,000	1,101,449	19,608,000	3,100,000	231,343	2,635,000
Delaware	3,267,000	125,653	1,862,190	745,000	55,185	1,043,000	11,100	822	10,545
Maryland	14,200,000	473,333	7,810,000	5,100,000	463,636	6,477,000	310,000	25,203	238,700
Virginia	21,333,000	969,681	11,519,820	6,700,000	837,500	8,107,000	545,000	60,555	425,100
North Carolina	22,275,000	1,485,000	13,365,000	3,050,000	406,666	3,782,000	340,000	37,777	295,800
South Carolina	9,240,000	905,882	9,240,000	750,000	107,142	1,275,000	40,000	6,153	54,800
Georgia	20,100,000	2,010,000	17,286,000	3,050,000	406,666	4,575,000	190,000	28,358	283,100
Florida	2,150,000	215,000	2,322,000	....	....	....	....	....	....
Alabama	24,500,000	1,944,444	18,375,000	1,190,000	140,000	1,463,700	22,000	2,095	33,440
Mississippi	23,220,000	1,290,000	16,718,400	420,000	38,181	634,200	15,500	1,313	22,010
Louisiana	7,920,000	510,967	7,048,800	....	....	....	....	....	....
Texas	31,000,000	1,550,000	25,730,000	2,510,000	139,444	3,187,700	52,000	2,872	57,200
Arkansas	19,448,000	648,266	10,112,960	1,955,000	158,943	2,052,750	62,000	4,525	63,860
Tennessee	58,000,000	2,188,679	23,780,000	13,130,000	1,544,705	13,261,300	260,000	27,659	231,400
West Virginia	10,560,000	362,886	5,913,600	2,000,000	294,117	2,760,000	265,000	23,043	246,450
Kentucky	60,200,000	1,807,807	24,682,000	7,960,000	796,000	8,358,000	1,100,000	94,017	1,001,000
Ohio	95,000,000	2,753,623	41,800,000	17,500,000	1,842,105	19,075,000	220,000	20,952	167,200
Michigan	23,600,000	715,151	14,396,000	16,870,000	1,249,629	19,400,500	275,000	19,503	236,500
Indiana	95,000,000	2,794,117	37,050,000	17,280,000	1,920,000	16,761,600	330,000	27,500	247,500
Illinois	280,000,000	8,163,265	95,200,000	27,300,000	2,600,000	24,843,000	2,600,000	157,572	1,586,000
Wisconsin	15,200,000	723,809	8,208,000	25,200,000	1,800,000	22,932,000	1,340,000	81,212	911,200
Minnesota	7,340,000	251,369	3,082,800	27,200,000	1,600,000	23,392,000	150,000	7,692	88,500
Iowa	160,000,000	4,571,428	43,200,000	29,800,000	3,072,164	21,158,000	650,000	36,111	175,500
Missouri	128,000,000	3,497,267	35,840,000	11,160,000	1,240,000	10,602,000	600,000	44,776	408,000
Kansas	76,700,000	1,917,500	17,641,000	12,700,000	747,058	11,049,000	1,380,000	78,857	703,800
Nebraska	28,000,000	700,000	5,600,000	3,400,000	346,938	2,176,000	50,000	3,125	26,000
California	1,500,000	41,322	1,605,000	23,800,000	2,163,636	28,084,000	75,000	4,285	69,000
Oregon	96,000	3,622	87,360	4,500,000	255,681	3,915,000	4,500	230	4,275
Nevada	15,000	517	16,200	380,000	21,111	456,000	....	....	....
The Territories	1,500,000	57,692	1,530,000	3,200,000	164,102	3,200,000	....	....	....
Total	1,321,069,000	44,841,371	555,445,930	292,136,000	26,381,512	294,580,990	17,722,100	1,359,788	13,631,900

B.—*Summary for each State showing the product, the area, and the value of each crop for* 1875—Continued.

States.	OATS.			BARLEY.			BUCKWHEAT.		
	Bushels.	Acres.	Value.	Bushels.	Acres.	Value.	Bushels.	Acres.	Value.
Maine	2, 400, 000	85, 714	$1, 344, 000	670, 000	31, 904	$596, 300	410, 000	17, 446	$287, 000
New Hampshire	1, 175, 000	30, 440	669, 750	102, 000	4, 063	104, 040	95, 000	4, 750	74, 100
Vermont	4, 560, 000	116, 923	2, 280, 000	116, 000	3, 945	105, 560	380, 000	17, 840	269, 800
Massachusetts	760, 000	21, 111	463, 600	130, 000	5, 306	141, 700	50, 000	4, 545	31, 000
Rhode Island	140, 000	4, 666	84, 000	27, 000	1, 350	27, 000	...	...	...
Connecticut	1, 090, 000	38, 928	664, 900	23, 600	1, 180	26, 432	135, 000	7, 714	128, 250
New York	36, 500, 000	1, 140, 625	16, 060, 000	7, 800, 000	433, 333	6, 942, 000	3, 750, 000	234, 375	2, 512, 500
New Jersey	3, 850, 000	160, 416	1, 848, 000	...	...	...	360, 000	21, 176	277, 200
Pennsylvania	32, 500, 000	1, 083, 333	13, 325, 000	520, 000	22, 608	530, 400	2, 320, 000	116, 000	1, 600, 800
Delaware	430, 000	20, 476	184, 900	...	...	...	...	...	...
Maryland	3, 050, 000	152, 500	1, 342, 000	...	...	...	72, 500	3, 111	44, 225
Virginia	5, 500, 000	366, 666	2, 695, 000	...	...	...	50, 600	2, 891	33, 902
North Carolina	3, 250, 000	250, 000	1, 885, 000	...	...	...	...	...	...
South Carolina	858, 000	68, 640	737, 880	...	...	...	...	...	...
Georgia	4, 100, 000	372, 727	3, 649, 000	15, 000	1, 250	26, 700	...	...	...
Florida	123, 000	9, 461	129, 150	...	...	...	...	...	...
Alabama	840, 000	60, 000	705, 600	...	...	...	...	...	...
Mississippi	800, 000	43, 243	712, 000	...	...	...	...	...	...
Louisiana	31, 500	2, 250	34, 650	...	...	...	...	...	...
Texas	1, 610, 000	50, 312	1, 159, 200	70, 000	2, 333	66, 500	...	...	...
Arkansas	940, 000	32, 413	545, 200	...	...	...	...	...	...
Tennessee	4, 820, 000	267, 777	2, 169, 000	82, 000	4, 315	65, 600	105, 000	6, 250	78, 750
West Virginia	2, 100, 000	100, 000	882, 000	48, 000	3, 200	36, 000	80, 000	4, 705	65, 600
Kentucky	6, 200, 000	295, 238	2, 852, 000	240, 000	11, 707	216, 000	...	...	...
Ohio	23, 750, 000	873, 161	8, 550, 000	800, 000	43, 243	720, 000	370, 000	24, 666	303, 400
Michigan	11, 500, 000	328, 571	4, 945, 000	960, 000	46, 829	883, 200	650, 000	34, 759	448, 500
Indiana	18, 000, 000	620, 689	5, 940, 000	440, 000	25, 882	387, 200	170, 000	8, 947	161, 500
Illinois	75, 000, 000	2, 272, 727	21, 000, 000	2, 900, 000	113, 281	2, 030, 000	180, 000	12, 000	144, 000
Wisconsin	26, 600, 000	680, 000	8, 778, 000	2, 200, 000	70, 967	2, 024, 000	275, 000	21, 153	217, 250
Minnesota	13, 000, 000	371, 428	4, 160, 000	1, 120, 000	40, 000	851, 200	49, 000	3, 266	37, 240
Iowa	28, 000, 000	742, 705	6, 720, 000	6, 300, 000	282, 511	3, 339, 000	160, 000	8, 163	123, 200
Missouri	20, 500, 000	648, 734	5, 535, 000	450, 000	23, 684	423, 000	60, 000	3, 448	39, 000
Kansas	9, 530, 000	288, 787	2, 287, 200	800, 000	36, 697	456, 000	240, 000	12, 972	172, 800
Nebraska	4, 375, 000	125, 000	962, 500	375, 000	16, 741	168, 750	85, 000	3, 953	63, 750
California	2, 100, 000	65, 625	1, 512, 000	9, 050, 000	502, 777	8, 235, 500	35, 000	1, 400	52, 500
Oregon	2, 450, 000	70, 000	1, 347, 500	450, 000	16, 666	315, 000	...	...	...
Nevada	85, 000	2, 361	62, 900	500, 000	18, 867	515, 000	...	...	...
The Territories	1, 800, 000	51, 428	1, 278, 000	720, 000	25, 263	720, 000	...	...	...
Total	354, 317, 500	11, 915, 075	129, 499, 930	36, 908, 600	1, 789, 902	29, 952, 082	10, 082, 100	575, 530	7, 166, 267

B.—*Summary for each State showing the* ***product, the area, and the value of each crop for*** 1875—Continued.

States.	POTATOES.			TOBACCO.			HAY.		
	Bushels.	Acres.	Value.	Pounds.	Acres.	Value.	Tons.	Acres.	Value.
Maine	5,810,000	54,299	$2,440,200	....	....	....	1,240,000	1,305,263	$13,454,000
New Hampshire	4,200,000	31,578	1,764,000	460,000	287	$69,000	780,000	821,052	9,991,800
Vermont	5,850,000	37,741	1,930,500	250,000	166	40,000	1,010,000	1,063,157	10,403,000
Massachusetts	3,500,000	23,333	1,820,000	8,500,000	6,296	1,615,000	580,000	580,000	12,116,200
Rhode Island	690,000	5,307	345,000	....	....	....	80,000	84,210	1,840,000
Connecticut	2,860,000	26,481	1,601,600	9,900,000	6,600	2,178,000	570,000	542,857	12,397,500
New York	35,000,000	327,102	12,600,000	2,750,000	3,437	302,500	4,900,000	4,188,034	68,600,000
New Jersey	4,100,000	50,000	2,214,000	....	....	....	490,000	490,000	10,466,400
Pennsylvania	12,250,000	127,604	5,145,000	16,000,000	11,428	1,600,000	2,400,000	2,181,818	41,088,000
Delaware	275,000	3,666	198,000	....	....	....	36,500	30,416	669,045
Maryland	1,250,000	17,361	675,000	22,000,000	32,592	1,826,000	190,000	190,000	3,596,700
Virginia	1,210,000	14,756	629,200	57,000,000	90,476	4,845,000	190,000	158,333	3,140,700
North Carolina	745,000	8,764	499,150	14,750,000	29,500	1,430,750	110,000	88,000	1,376,100
South Carolina	102,000	1,133	103,020	....	....	....	22,500	22,500	461,250
Georgia	340,000	5,000	408,000	1,350,000	2,454	319,950	22,000	15,714	388,960
Florida	....	....	....	450,000	600	112,500	....	....	....
Alabama	155,000	3,100	189,100	175,000	376	43,750	22,000	16,923	427,460
Mississippi	240,000	3,200	232,800	112,000	353	28,000	22,000	14,666	374,000
Louisiana	70,000	933	77,000	....	....	....	15,000	10,000	243,750
Texas	400,000	4,000	488,000	135,000	207	33,750	75,000	60,000	937,500
Arkansas	270,000	2,673	213,300	1,250,000	1,520	152,500	21,600	15,428	352,080
Tennessee	1,100,000	15,714	616,000	35,000,000	51,852	2,520,000	145,000	106,617	2,354,800
West Virginia	1,150,000	10,454	586,500	2,240,000	3,294	235,200	230,000	191,666	3,160,200
Kentucky	1,650,000	16,836	808,500	130,000,000	206,349	8,580,000	275,000	211,538	3,918,750
Ohio	12,700,000	123,300	4,572,000	13,500,000	19,285	810,000	1,900,000	1,727,282	24,643,000
Michigan	10,625,000	85,000	3,293,750	....	....	....	1,220,000	1,016,868	17,690,000
Indiana	5,450,000	42,788	1,962,000	12,750,000	25,500	701,250	1,050,000	807,692	12,064,500
Illinois	15,200,000	118,750	4,864,000	8,000,000	14,545	448,000	3,050,000	2,226,277	29,676,500
Wisconsin	7,600,000	72,380	2,204,000	2,500,000	4,464	150,000	1,420,000	1,051,851	13,532,600
Minnesota	4,500,000	36,000	1,305,000	....	....	....	857,000	634,814	4,499,250
Iowa	8,700,000	79,090	2,088,000	....	....	....	1,920,000	1,422,222	11,097,600
Missouri	6,300,000	57,272	2,331,000	40,000,000	47,058	2,280,000	700,000	538,461	7,196,000
Kansas	4,480,000	40,000	1,209,600	275,000	410	21,450	960,000	711,111	2,918,400
Nebraska	1,950,000	15,000	370,500	....	....	....	350,000	250,000	1,277,500
California	3,500,000	29,166	3,290,000	....	....	....	690,000	492,857	11,447,100
Oregon	845,000	6,500	642,200	....	....	....	120,000	87,591	1,328,400
Nevada	210,000	1,909	199,500	....	....	....	50,000	38,461	900,000
The Territories	1,600,000	11,851	1,104,000	....	....	....	160,000	114,285	2,174,400
Total	166,877,000	1,510,041	65,019,420	379,347,000	559,049	30,342,600	27,873,600	23,507,964	342,203,445

C.—*Table showing the average yield per acre and the price per bushel, pound, or ton of farm products for the year* 1875.

STATES.	CORN.		WHEAT.		RYE.		OATS.		BARLEY.		BUCKWHEAT.		POTATOES.		TOBACCO.		HAY.	
	Bushels.	Price per bushel.	Bushels.	Price per bushel.	Bushels.	Price per bushel.	Bushels.	Price per bushel.	Bushels.	Price per bushel.	Bushels.	Price per bushel.	Bushels.	Price per bushel.	Pounds.	Price per paund.	Tons.	Price per ton.
Maine	30.5	$0 96	14	$1 64	16.7	$1 18	28	$0 56	21	$0 89	23.5	$0 70	107	$0 42	....	....	0.95	$10 85
New Hampshire	38	94	17	1 64	18.5	1 11	38.6	57	25.1	1 02	20	78	133	42	1,600	$0 15	95	12 81
Vermont	37	94	17.5	1 55	19	1 01	39	50	29.4	91	21.3	71	155	33	1,500	16	95	10 30
Massachusetts	37	95	16	1 37	17	1 07	36	61	24.5	1 09	11	62	150	52	1,350	19	1.00	20 89
Rhode Island	27.5	1 10	....	....	15	1 20	30	60	20	1 00	....	....	130	50	....	....	95	23 00
Connecticut	29	1 00	16	1 33	15	1 10	28	61	20	1 12	17.5	95	108	56	1,500	22	1.05	21 75
New York	34	74	8	1 31	10	86	32	44	18	69	16	67	107	36	800	11	1.17	14 00
New Jersey	41	65	12	1 36	12.7	89	24	48	....	....	17	77	82	54	....	....	1.00	21 36
Pennsylvania	40	58	13.8	1 29	13.4	85	30	41	23	1 02	20	69	96	42	1,400	10	1.10	17 12
Delaware	26	57	13.5	1 40	13.5	95	21	43	....	....	....	....	75	72	....	....	1.20	18 33
Maryland	30	55	11	1 27	12.3	77	20	44	....	....	23.3	61	72	54	675	8.3	1.00	18 93
Virginia	22	54	8	1 21	9	78	15	49	....	....	17.5	67	82	52	630	8.5	1.20	16 53
North Carolina	15	60	7.5	1 24	9	87	13	58	....	....	....	....	85	67	500	9.7	1.25	12 51
South Carolina	10.2	1 00	7	1 70	6.5	1 37	12.5	86	....	....	....	....	90	1 01	....	....	1.00	20 50
Georgia	10	86	7.5	1 50	6.7	1 49	11	89	12	1 78	....	....	68	1 20	550	23.7	1.40	17 68
Florida	10	1 08	....	....	....	....	13	1 05	....	....	....	....	....	....	750	25	....	....
Alabama	12.6	75	8.5	1 23	10.5	1 52	14	84	....	....	....	....	50	1 22	465	25	1.30	19 43
Mississippi	18	72	11	1 51	11.8	1 42	18.5	89	....	....	....	....	75	97	317	25	1.50	17 00
Louisiana	15.5	89	....	....	....	....	14	1 10	....	....	....	....	75	1 10	....	....	1.50	16 25
Texas	20	83	18	1 27	18.1	1 10	32	72	30	95	....	....	100	1 22	650	25	1.25	12 50
Arkansas	30	52	12.3	1 05	13.7	1 03	29	58	....	....	....	....	101	79	822	12.2	1.40	16 30
Tennessee	26.5	41	8.5	1 01	9.4	89	18	45	19	80	16.8	75	70	56	675	7.2	1.36	16 24
West Virginia	29.1	56	6.8	1 38	11.5	93	21	42	15	75	17	82	110	51	680	10.5	1.20	13 74
Kentucky	33.3	41	10	1 05	11.7	91	21	46	20.5	90	....	....	98	49	630	6.6	1.30	14 25
Ohio	34.5	44	9.5	1 09	10.5	76	27.2	36	18.5	90	15	82	103	36	700	6	1.10	12 97
Michigan	33	61	13.5	1 15	14.1	86	35	43	20.5	92	18.7	69	125	31	....	....	1.20	14 50
Indiana	34	39	9	97	12	75	29	33	17	88	19	95	104	36	500	5.5	1.30	11 49
Illinois	34.3	34	10.5	91	16.5	61	33	28	25.6	70	15	80	128	32	550	5.6	1.37	9 73
Wisconsin	21	54	14	91	16.5	68	38.5	33	31	92	13	79	105	29	560	6	1.35	9 53
Minnesota	29.2	42	17	86	19.5	59	35	32	28	76	15	76	125	29	....	....	1.35	5 25
Iowa	35	27	9.7	71	18	27	37.7	24	22.3	53	19.6	77	110	24	....	....	1.35	5 78
Missouri	36.6	28	9	95	13.4	68	31.6	27	19	94	17.4	65	110	37	850	5.7	1.30	10 28
Kansas	40	23	17	87	17.5	51	33	24	21.8	57	18.5	72	112	27	670	7.8	1.35	3 04
Nebraska	40	20	9.8	64	16	52	35	22	22.4	45	21.5	75	130	19	....	....	1.40	3 65
California	36.3	1 07	11	1 18	17.5	92	32	72	18	91	25	1 50	120	94	....	....	1.40	16 59
Oregon	26.5	91	17.6	87	19.5	95	35	55	27	70	....	....	130	76	....	....	1.37	11 07
Nevada	29	1 08	18	1 20	....	....	36	74	26.5	1 03	....	....	110	95	....	....	1.30	18 00
The Territories	26	1 02	19.5	1 00	....	....	35	71	28.5	1 00	....	....	135	69	....	....	1.40	13 59

D.—*Table showing the average cash value per acre of farm products for the year 1875.*

States.	Corn.	Wheat.	Rye.	Oats.	Barley.	Buckwheat.	Potatoes.	Tobacco.	Hay.
Maine	$29 28	$22 96	$19 70	$15 68	$18 69	$16 45	$44 94	....	$10 30
New Hampshire	35 72	27 88	20 53	22 00	25 60	15 60	55 86	$240 00	12 16
Vermont	34 78	27 12	19 19	19 50	26 75	15 12	51 15	240 00	9 78
Massachusetts	35 15	21 92	18 19	21 96	26 70	6 82	78 00	256 50	20 89
Rhode Island	30 25	....	18 00	18 00	20 00	....	65 00	....	21 85
Connecticut	29 00	21 28	16 50	17 08	22 40	16 62	60 48	330 00	22 83
New York	25 16	10 48	8 60	14 08	16 02	10 72	38 52	88 00	16 38
New Jersey	26 65	16 32	11 30	11 52	....	13 09	44 28	....	21 36
Pennsylvania	23 20	17 80	11 39	12 30	23 46	13 80	40 32	140 00	18 83
Delaware	14 82	18 90	12 82	9 03	....	....	54 00	....	21 99
Maryland	16 50	13 97	9 47	8 80	....	14 21	38 88	56 02	18 93
Virginia	11 88	9 68	7 02	7 35	....	11 72	42 64	53 55	19 83
North Carolina	9 00	9 30	7 83	7 54	....	....	56 95	48 50	15 63
South Carolina	10 20	11 90	8 90	10 75	....	....	90 90	....	20 50
Georgia	8 60	11 25	9 98	9 79	21 36	....	81 60	130 35	24 75
Florida	10 80	....	....	13 65	....	....	....	187 50	....
Alabama	9 45	10 45	15 96	11 76	....	....	61 00	116 25	25 25
Mississippi	12 96	16 61	16 75	16 46	....	....	72 75	79 25	25 50
Louisiana	13 79	....	....	15 40	....	....	82 50	....	24 37
Texas	16 60	22 86	19 91	23 04	28 50	....	122 00	162 50	15 62
Arkansas	15 60	12 91	14 11	16 82	....	....	79 79	100 28	22 82
Tennessee	10 86	8 58	8 36	8 10	15 20	12 60	39 20	48 60	22 08
West Virginia	16 29	9 38	10 69	8 82	11 25	13 94	56 10	71 40	16 48
Kentucky	13 65	10 50	10 64	9 66	18 45	....	48 02	41 58	18 52
Ohio	15 18	10 35	7 98	9 79	16 65	12 30	37 08	42 00	14 26
Michigan	20 13	15 52	12 12	15 05	18 86	12 90	37 75	....	17 40
Indiana	13 26	8 73	9 00	9 57	14 96	18 05	37 44	27 50	14 93
Illinois	11 66	9 55	10 06	9 24	17 92	12 00	40 96	30 80	13 33
Wisconsin	11 34	12 74	11 22	12 70	28 52	10 27	30 45	33 60	12 86
Minnesota	12 26	14 62	11 50	11 20	21 28	11 40	36 25	....	7 08
Iowa	9 45	6 88	4 86	9 04	11 81	15 09	26 40	....	7 80
Missouri	10 24	8 55	9 11	8 53	17 86	11 31	40 70	48 45	13 36
Kansas	9 20	14 79	8 92	7 92	12 42	13 32	30 24	52 26	4 10
Nebraska	8 00	6 27	8 32	7 70	10 08	16 12	24 70	....	5 11
California	38 84	12 98	16 10	23 04	16 38	37 50	112 80	....	23 22
Oregon	24 11	15 31	18 52	19 25	18 90	....	98 80	....	15 16
Nevada	31 32	21 60	....	26 64	27 29	....	104 50	....	23 40
The Territories	26 52	19 50	....	24 85	28 50	....	93 15	....	19 02

E.—*Table showing the average cash value per acre of the principal crops of the farm for the year 1875.*

States.	Average value per acre.	States.	Average value per acre.
Maine	$12 74	Texas	$17 49
New Hampshire	15 37	Arkansas	15 62
Vermont	13 22	Tennessee	10 69
Massachusetts	25 70	West Virginia	13 97
Rhode Island	24 57	Kentucky	14 65
Connecticut	27 03	Ohio	13 55
New York	16 73	Michigan	17 53
New Jersey	20 88	Indiana	12 00
Pennsylvania	18 58	Illinois	11 46
Delaware	16 79	Wisconsin	13 08
Maryland	16 21	Minnesota	12 70
Virginia	12 55	Iowa	8 60
North Carolina	9 81	Missouri	10 59
South Carolina	10 08	Kansas	9 51
Georgia	9 47	Nebraska	7 28
Florida	11 39	California	16 44
Alabama	9 80	Oregon	17 35
Mississippi	13 46	Nevada	25 83
Louisiana	14 12	The Territories	23 56

F.—*A general summary showing the estimated quantities, number of acres, and aggregate value of the principal crops of the farm in* 1875.

Products.	Number of bushels, &c.	Number of acres.	Value.
Indian corn .... bushels..	1,321,069,000	44,841,371	$555,445,930
Wheat .... do....	292,136,000	26,381,512	294,580,990
Rye .... do....	17,722,100	1,359,788	13,631,900
Oats .... do....	354,317,500	11,915,075	129,499,930
Barley .... do....	36,908,600	1,789,902	29,952,082
Buckwheat .... do....	10,082,100	575,530	7,166,267
Potatoes .... do....	166,877,000	1,510,041	65,019,420
Total	2,199,112,300	88,373,219	1,095,296,519
Tobacco .... pounds..	379,347,000	559,049	30,342,600
Hay .... tons..	27,873,600	23,507,964	342,203,445
Cotton .... bales..	4,600,000	10,803,030	272,936,400
Grand total	....	123,243,262	1,740,778,964

G.—*Table showing the average yield and cash value per acre, and price per bushel, pound, or ton of farm products for the year* 1875.

Products.	Average yield per acre.	Average price per bushel.	Average value per acre.
Indian corn .... bushels..	29.4 +	$0 42.0 +	$12 38
Wheat .... do....	11.0 +	1 00.0 +	11 16
Rye .... do....	13.0 +	76.9 +	10 02
Oats .... do....	29.7 +	36.5 +	10 86
Barley .... do....	20.6 +	81.1 +	16 73
Buckwheat .... do....	17.5 +	71.0 +	12 45
Potatoes .... do....	110.5 +	38.9 +	43 05
Tobacco .... pounds..	678.5 +	08.0 −	54 27
Hay .... tons..	1.18+	12 27	14 55
Cotton .... pounds..	1.98	12.76	25 26

NUMBERS AND CONDITION OF FARM-ANIMALS.

Diseases among cattle were limited in both range and intensity in 1875. Winter meteorological conditions were more favorable for comfort and health of domestic animals than usual in those sections in which protection is furnished only in part or not at all, and the measure of such care and attention was somewhat larger and more general than in former years. There was very general exemption from prevailing maladies in New England. In a few counties in the Middle States appeared some forms of disease with something like epizootic force, and in the Southern States a local prevalence of similar types of disease was attended with still greater mortality.

In Berkshire, Massachusetts, in June, cattle imported into two or three towns from the West showed the presence of Texas fever, but confined to half a dozen herds. Sanitary measures, promptly taken, arrested the spread of the disease, while embargo and quarantine regulations stopped further importations. In Livingston, New York, 30 or 40 western cattle, all of one herd, died of this disease, but native stock were entirely unaffected. Some western cattle died in Washington, Pennsylvania. A disease resembling Texas fever in some points is noted in Burke, North Carolina, where, like other diseases, it is designated by the unmeaning term murrain. This disease annually makes its appearance from the coast, traveling westward; it has prevailed in this region for fifteen years, but its severity is less marked than formerly. The Texas fever is also noted in a few cases in Lorain, Ohio, and Scott, Illinois; in the last-named instance the animals were all imported.

Abortion is a serious evil in the dairy-regions. A general desire is expressed for a scientific investigation by this Department, to determine its causes and possible means of prevention. Such an investigation is due to this great producing interest. Cases are reported most numerously in New York, New Jersey, and Pennsylvania; and some have been noted in the South and West, and in California.

Pleuro-pneumonia for several years past has been more prevalent in Maryland than elsewhere. Several herds in Burlington County, New Jersey, have suffered from it. This disease has prevailed in milk-dairies, where large numbers are crowded together in filthy stables; and there are complaints of the reprehensible practice of slaughtering and selling the meat on the appearance of the first symptoms of the disease. Ordinary lung-fever, resulting from exposure of cattle accustomed to warm stables, is more general in its range, but does not spread by contact.

The epizootic influenza of horses which prevailed in the fall and winter of 1872–'73 re-appeared in the autumn of 1875 in nearly all the States; the symptoms, however, were mild, and the disease readily yielded to ordinary treatment. The mortality was also much less formidable than during the former visitation. In parts of the country where farm-horses are worked hard all winter, as in the lumbering districts, the disease left some permanent injuries in the form of heaves and other abnormal conditions. In some cases the symptoms were so like the common distemper as to be mistaken for it.

Pneumonia was reported in a few cases, the most notable in Washington, New York, and Lawrence, Pennsylvania. Blind-staggers is one of the most prevalent diseases, especially in the Southern States; from this cause a loss of two hundred animals is reported in Cumberland, New Jersey, and nearly as many in Kent, Delaware.

Diseases of sheep have not been especially numerous, yet foot-rot, rot, scab, grub in head, and other maladies, cause a great aggregate of loss.

It is very probable that $100,000,000 represents scarcely more than the annual losses of farm-animals from disease and neglect, of which half could undoubtedly be saved by efficient means of cure and prevention. Persistent and intelligent effort in scientific investigation, under Government patronage, ought to result in a saving of some millions of this annual loss to production. The proportion of these losses suffered by the pork-producing interest is enormously large, and their reduction is quite as much in the interest of public health as of public wealth.

The estimates of numbers of farm-animals are all increased over those of January, 1875, except as to swine, which are reported less by exceeding two millions. The average value of stock-hogs in January was estimated at $6.80 in place of $5.34 the year previous. The average value of sheep is raised from $2.60 to $2.79. Cows, last year averaging $28.52, make an average of $28.89; and "other cattle" have advanced from $18.68 to $19.04. Horses and mules alone are lower, the former rating at $64.96 instead of $68.01, and the latter $75.33 in place of $80. The estimates of numbers and value foot up as follows:

	Number.	Average price.	Value.
Horses	9, 735, 300	$64 96	$632, 446, 985
Mules	1, 414, 500	75 33	106, 565, 114
Cows	11, 085, 400	28 89	320, 346, 728
Other cattle	16, 785, 300	19 04	319, 623, 509
Sheep	35, 935, 300	2 60	93, 666, 318
Swine	25, 726, 800	6 80	175, 070, 484
Total			1, 647, 719, 138

H.—*Table showing the estimated number, average price, and value of each kind of live-stock in January,* 1876.

States.	HORSES.			MULES.			MILCH-COWS.		
	Number.	Average price.	Value.	Number.	Average price.	Value.	Number.	Average price.	Value.
Maine	79,400	$81 41	$6,463,954	....	....	....	164,300	$37 00	$6,079,100
New Hampshire	47,000	80 94	3,804,180	....	....	....	98,200	38 50	3,780,700
Vermont	74,500	83 24	6,201,380	....	....	....	209,500	33 70	7,060,150
Massachusetts	104,700	89 94	9,416,718	....	....	....	140,300	48 33	6,780,099
Rhode Island	14,700	97 87	1,438,689	....	....	....	20,400	39 00	795,600
Connecticut	51,100	82 14	4,197,354	....	....	....	110,900	43 33	4,805,297
New York	679,100	90 00	61,119,000	18,500	$98 35	$1,819,475	1,496,300	37 50	56,111,250
New Jersey	115,700	110 84	12,824,188	15,000	128 32	1,924,800	144,900	44 37	6,429,213
Pennsylvania	585,100	84 70	49,557,970	26,300	96 15	2,528,745	837,000	34 68	29,027,160
Delaware	19,600	83 45	1,635,620	4,000	95 00	380,000	23,000	32 00	736,000
Maryland	105,500	83 22	8,779,710	11,000	105 86	1,164,460	100,700	30 31	3,052,217
Virginia	194,900	69 53	13,551,397	29,800	85 60	2,550,880	227,000	22 77	5,168,790
North Carolina	139,700	74 97	10,473,309	51,700	82 54	4,267,318	201,000	15 48	3,111,480
South Carolina	56,900	88 58	5,040,202	44,700	94 07	4,204,929	159,300	19 75	3,146,175
Georgia	118,300	79 37	9,389,471	96,200	87 12	8,380,944	265,100	17 02	4,512,002
Florida	16,700	78 22	1,306,274	9,600	91 65	879,840	66,800	14 62	976,616
Alabama	104,400	71 36	7,449,984	101,400	80 20	8,132,280	168,200	20 27	3,409,414
Mississippi	89,100	76 04	6,775,164	96,100	97 07	9,328,427	174,600	21 03	3,671,838
Louisiana	76,300	58 78	4,484,914	79,900	83 96	6,708,404	89,600	20 71	1,855,616
Texas	770,400	33 17	25,554,168	110,700	53 59	5,932,413	500,100	15 72	7,861,572
Arkansas	158,900	54 09	8,594,901	83,400	67 50	5,629,500	160,900	16 20	2,606,580
Tennessee	318,000	62 64	19,919,520	101,900	67 82	6,910,858	225,700	20 83	4,701,331
West Virginia	111,900	59 44	6,651,336	2,400	68 08	163,392	125,500	25 77	3,234,135
Kentucky	364,700	56 94	20,766,018	85,000	58 93	5,009,050	244,700	27 94	6,835,918
Ohio	760,800	69 14	52,601,712	26,500	72 04	1,909,060	809,600	32 65	26,433,440
Michigan	296,900	82 31	24,437,839	3,800	96 12	365,256	361,100	33 70	12,169,070
Indiana	675,600	61 76	41,725,056	58,400	71 71	4,187,864	434,900	27 40	11,916,260
Illinois	1,091,700	59 75	65,229,075	111,100	71 37	7,929,207	717,800	29 05	20,852,090
Wisconsin	352,100	67 05	23,608,305	5,200	85 26	443,352	474,000	26 75	12,679,500
Minnesota	172,400	75 09	12,945,516	3,200	95 79	306,528	233,500	25 19	5,881,865
Iowa	685,800	63 83	43,774,614	37,000	82 21	3,041,770	621,800	26 90	16,726,420
Missouri	581,500	45 40	26,400,100	126,200	56 03	7,070,986	438,200	20 86	9,140,852
Kansas	227,300	49 63	11,280,899	20,700	64 40	1,333,080	235,700	23 76	5,600,232
Nebraska	67,900	69 42	4,713,618	4,600	98 00	450,800	59,700	28 09	1,676,978
California	209,300	45 46	9,514,778	19,400	77 20	1,497,680	363,800	31 46	11,445,148
Oregon	91,400	42 68	3,900,952	3,700	45 68	169,016	80,900	21 75	1,759,575
Nevada	10,900	54 00	588,600	1,100	78 00	85,800	9,900	33 00	326,700
The Territories	115,100	55 00	6,330,500	26,000	71 50	1,859,000	290,500	27 50	7,988,750
Total	9,735,300	....	632,446,985	1,414,500	....	106,565,114	11,085,400	....	320,346,728
Grand average of prices	....	64 96	....	....	75 33	....	....	28 89	....

H.—*Table showing the estimated number, average price, and value of live-stock in January,* 1876—Continued.

States.	Oxen and other cattle.			Sheep.			Hogs.		
	Number.	Average price.	Value.	Number.	Average price.	Value.	Number.	Average price.	Value.
Maine	201, 900	$35 44	$7, 155, 336	525, 900	$3 78	$1, 987, 902	58, 800	$11 66	$685, 608
New Hampshire	118, 000	38 12	4, 498, 160	242, 400	2 70	654, 480	37, 300	16 20	604, 260
Vermont	130, 500	29 33	3, 827, 565	490, 500	3 74	1, 834, 470	51, 800	12 19	631, 442
Massachusetts	120, 000	47 59	5, 710, 800	76, 300	3 63	276, 969	75, 600	18 03	1, 363, 068
Rhode Island	16, 000	49 72	795, 520	25, 300	3 96	100, 188	16, 300	17 05	277, 915
Connecticut	114, 100	36 68	4, 185, 188	92, 500	4 18	386, 650	57, 900	16 73	968, 667
New York	663, 200	31 85	21, 122, 920	1, 936, 500	3 95	7, 649, 175	568, 700	11 39	6, 477, 493
New Jersey	83, 000	36 60	3, 037, 800	125, 800	5 01	630, 258	153, 000	13 83	2, 115, 990
Pennsylvania	708, 100	29 03	20, 556, 143	1, 640, 500	3 58	5, 872, 990	875, 000	11 50	10, 062, 500
Delaware	31, 700	24 72	783, 624	23, 600	3 67	86, 612	46, 700	10 61	495, 487
Maryland	119, 300	22 87	2, 728, 391	141, 200	3 89	549, 268	233, 500	7 10	1, 657, 850
Virginia	397, 500	16 86	6, 701, 850	356, 400	2 93	1, 044, 252	589, 800	4 45	2, 624, 610
North Carolina	313, 200	10 19	3, 191, 508	283, 900	1 58	448, 562	758, 300	4 01	3, 040, 783
South Carolina	186, 700	11 69	2, 182, 523	142, 700	1 81	258, 287	275, 900	4 11	1, 133, 949
Georgia	400, 900	8 91	3, 572, 019	371, 200	1 73	642, 176	1, 360, 700	3 91	5, 320, 337
Florida	363, 400	8 14	2, 958, 076	37, 800	1 94	73, 332	175, 400	2 26	396, 404
Alabama	327, 300	12 79	4, 186, 167	185, 900	1 93	358, 787	755, 900	3 99	3, 016, 041
Mississippi	307, 100	11 85	3, 639, 135	151, 800	1 81	274, 758	792, 900	4 31	3, 417, 399
Louisiana	171, 900	11 68	2, 007, 792	68, 800	2 04	140, 352	222, 600	3 98	885, 948
Texas	2, 343, 700	9 57	22, 429, 209	1, 691, 400	2 00	3, 382, 800	1, 090, 000	4 09	4, 458, 100
Arkansas	261, 300	10 62	2, 775, 006	192, 400	2 01	386, 724	901, 200	3 31	3, 523, 692
Tennessee	323, 700	12 19	3, 945, 903	341, 700	2 11	720, 987	1, 026, 400	5 22	5, 357, 808
West Virginia	235, 200	21 63	5, 087, 376	544, 500	2 55	1, 388, 475	248, 400	5 38	1, 336, 392
Kentucky	389, 600	21 14	8, 236, 144	683, 600	2 85	1, 948, 260	1, 604, 300	5 51	8, 839, 693
Ohio	864, 900	24 87	21, 510, 063	4, 546, 600	2 72	12, 366, 752	1, 596, 100	8 06	12, 864, 566
Michigan	410, 000	26 35	10, 803, 500	3, 450, 600	2 65	9, 144, 090	459, 700	7 93	3, 645, 421
Indiana	772, 300	19 65	15, 175, 695	1, 250, 000	2 62	3, 275, 000	2, 136, 000	7 70	16, 447, 200
Illinois	1, 287, 000	21 54	27, 721, 980	1, 311, 000	2 41	3, 159, 510	2, 640, 100	8 63	22, 784, 063
Wisconsin	448, 900	20 39	9, 153, 071	1, 162, 800	2 74	3, 186, 072	540, 700	7 58	4, 098, 506
Minnesota	329, 500	20 05	6, 606, 475	190, 200	2 63	500, 226	213, 400	6 99	1, 491, 666
Iowa	913, 200	20 91	19, 095, 012	1, 663, 900	2 66	4, 425, 974	3, 296, 200	8 08	26, 633, 296
Missouri	813, 800	17 38	14, 143, 844	1, 284, 200	1 86	2, 388, 612	1, 874, 300	5 94	11, 133, 342
Kansas	486, 200	18 95	9, 213, 490	123, 900	2 80	346, 920	246, 500	8 91	2, 196, 315
Nebraska	86, 900	20 76	1, 804, 044	48, 900	2 77	135, 453	80, 900	7 58	613, 222
California	1, 075, 000	20 08	21, 586, 000	6, 750, 000	2 02	13, 635, 000	363, 300	7 17	2, 604, 861
Oregon	137, 600	12 75	1, 754, 400	710, 500	1 99	1, 413, 895	181, 500	4 41	800, 415
Nevada	46, 700	21 00	980, 700	20, 900	2 60	54, 340	5, 200	9 00	46, 800
The Territories	786, 000	18 78	14, 761, 080	3, 049, 200	2 80	8, 537, 760	116, 500	8 75	1, 019, 375
Total	16, 785, 300	....	319, 623, 509	35, 935, 300	....	93, 666, 318	25, 726, 800	....	175, 070, 484
Grand average of prices	....	19 04	....	....	2 60	....	....	6 80	....

CENTENNIAL STATISTICS.

An important work of the closing portion of 1875 has been the preparation of appropriate exhibits of this division at the Centennial Exhibition at Philadelphia. These exhibits are designed to present in compact form and logical arrangement, with such aids to interpretation as are afforded by color and mathematical delineation, some of the main facts which illustrate the progress of settlement, production, and rural improvement in the United States. With a national census giving only the estimated production of the principal crops once in ten years, and very few of the States making any attempt in the direction of agricultural statistics, the field of prompt and general agricultural inquiry is left almost entirely to the statistical division of the Department of Agriculture. The rapid extension of cultivation in Western States and Territories and in the Pacific and Southwestern States, which causes changes in a single year that appear almost incredible, as for instance the increase of corn production in Kansas from 16,000,000 of bushels in 1874 to 80,000,000 in 1875, renders the work of this division exceedingly active and difficult. To gather the immense array of fragmentary data, and present for the Centennial a rounded and complete result in as many essential points as possible, much special statistical work was necessary, which has been reduced to a minimum by the extremely limited appropriation available for the service. The line of effort adopted included, first, statistical record, in album form, of the several great classes of agricultural facts, in plain text and with map, diagram, and pictorial illustrations, designed to present briefly a more succinct summary than has ever been presented to the public, and more complete in the classes of facts selected for exposition; second, a series of large outline maps illustrating the geographical distribution of crops and various results of original investigation; third, a series of charts and diagrams, showing important facts in production and distribution, industrial education, and political economy.

MAPS.

The large maps, representing the territory of the United States, are constructed from series of sixteen sheets, each set making an outline map 17 by 12 feet, as follows:

1. Map showing in five degrees of density the comparative value of farm-lands in the United States.

The values are those of the last census, the division of area by groups of counties, the first class including all area averaging less than $10 per acre; the second, those counties averaging between $10 and $20; the third, those not exceeding $30; the fourth, not exceeding $40; the fifth, those exceeding $40. The fifth tint is found mainly in the southern half of New England, in the Middle States, and in the Ohio Valley States, with a few patches of the deeper hue on the Upper Mississippi and a portion of the Missouri Valley.

2. Map showing the respective rates of wages of farm-labor in the several States.

This map is based upon an investigation made by the statistical division in 1874, which was the third of a series made at intervals of several years, all mutually corroborative in a singular degree. It shows the average rate of monthly wages without board in each State, by classes indicated by five tints of color. The classes are as follows: Under $20: South Carolina, $12.84; North Carolina, $13.46; Alabama, $13.60; Georgia, $14.40; Virginia, $14.84; Tennessee, $15.20; Florida, $15.50; Mississippi, $16.40; Kentucky, $18.12; Louisiana, $18.40; Missouri, $19.40; Texas, $19.50. Under $25: Maryland, $20.02; Delaware, $20.53; Arkansas, $20.50; West Virginia, $20.75; New Mexico, $22.75; Kansas, $23.20; Nebraska, $24; Ohio, $24.05; Indiana, $24.20; Iowa, $24.35. Under $30: Illinois, $25.20; Maine, $25.40; Wisconsin, $25.50; Pennsylvania,

$25.89; Minnesota, $26.16; New York, $27.14; Michigan, $28.22; Connecticut, $28.25; New Hampshire, $28.57; Vermont, $29.67. Under $35: Rhode Island, $30; New Jersey, $30.71; Massachusetts, $31.87; Dakota, $32.50. Thirty-five dollars and over: Washington, $35; Utah, 35.50; Oregon, $38.25; Colorado, $38.50; California, $44.50; Montana, $45; Wyoming, $47.50.

3. Map showing in five degrees of density the proportion of woodlands to farm areas in the United States.

This map is based upon the census returns of farm-lands, and does not indicate forest areas in unappropriated public lands or in wild lands not in farms. It is divided into groups of counties in five classes, the first including all areas with less than 15 per cent. in forest, the other classes divided respectively by 30, 45, and 60 per cent.

4. Map showing in five degrees of density the distribution of the sugar crops of the United States.

The localities in which these crops are grown, viz, cane, sorghum, maple, and beet, are indicated by a specific color for each, and the degree of production attained is shown by three tints of each color. Counties yielding less than 100 hogsheads of cane-sugar are not counted as sugar-producing area; those yielding 100 to 500 are placed in the first class; those with a production of 1,000 to 5,000 in the second class; and those with 5,000 and over in the third. The cane district is seen to be very limited, confined mainly to a small section of Louisiana. Sorghum comes next in geographical position, including the Southern States, the southern borders of the Middle States, and including the great corn region of the interior. The range for three tints is 10,000 to 30,000 gallons sirup for the first; 30,000 to 50,000; and 50,000 and over. The maple is utilized for saccharine production in a still more northern belt. The range is 10,000 to 100,000 pounds of sugar; 100,000 to 500,000; 500,000 and over. Beet-sugar is produced as yet only in two places in California, Sacramento and Soquel, and to a limited extent in Freeport, Ill. The experiment has been tried in other parts of Illinois and in Wisconsin, whence the business was removed to California.

5. Map showing in five degrees of density the distribution of textile fabrics in the United States.

Counties producing less than 1,000 bales of cotton are not considered; those yielding 1,000 to 5,000 bales constitute the first class, those with 5,000 to 10,000 the second, and those with 10,000 and over the third. The three classes of hemp counties are limited respectively by the ranges of 50 to 500 tons, 500 to 1,000, and 1,000 and over. For flax-fiber the range is 100,000 to 500,000 pounds, 500,000 to 1,000,000, and over 1,000,000 pounds. For flax-seed, 1,000 to 5,000 bushels; 5,000 to 20,000; 20,000 and over. For wool, 100,000 to 250,000 pounds; 250,000 to 500,000; 500,000 pounds and over.

6. Map showing the fruit area of the United States in proportion to areas in improved land, with indications of the principal regions producing the various standard fruits.

This map is divided by States into four classes of tints. In the first or lowest class are the Territories, Nevada, Minnesota, and Nebraska, having less than 1 per cent. of improved land in fruit; the second includes those having from 1 to 2 per cent., as the Northern Atlantic and Gulf Coast States—except Florida—the Northern New England States and Wisconsin; the third, New York, Pennsylvania, the Ohio Valley States, Tennessee, and the Pacific Coast States; and the fourth, the Southern New England States, New Jersey, Delaware, Maryland, Florida, Michigan, and Wisconsin.

SMALL MAPS.

7. Showing the proportion of improved land to the farm area of each State and Territory.

This map illustrates, by density of color, the comparative extent of improved or cultivated areas in the several States. In some of the Territories the proportion is so large as to excite surprise, simply because of the abundance of public lands available for pasturage or cultivation, and the fact that lands are not purchased until actually needed for use. In the center of large grazing-tracts land may be taken up for occupancy as a ranch, or grazier's headquarters, while ten times the surrounding public area is occupied without purchase or rent.

There are five classes, the first including States under 30 per cent., viz, North Carolina, South Carolina, Georgia, Louisiana, Texas, Arkansas, Dakota, Colorado, New Mexico, Washington, Wyoming. The remaining classes are as follows: Second, between 30 and 40 per cent.: Florida, Alabama, Minnesota, Mississippi, Tennessee, West

Virginia, Kansas, Nebraska, Idaho; 40 and under 50 per cent.: Maine, Virginia, Kentucky, Missouri, Oregon, Nevada; 50 and under 60 per cent.: Rhode Island, Indiana, Michigan, Wisconsin, California; over 60 per cent.: New Hampshire, Vermont, Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Ohio, Illinois, Iowa, Utah, Arizona, Montana.

This chart also indicates the extent of several crop-belts, by a delineation of the line of northern limit respectively of sea-island cotton, upland cotton, sorghum, and winter-wheat. The line dividing spring wheat from winter is worthy of careful study, as it separates, tortuous as it appears, within one or two parts in a hundred, the entire production of fall and spring sown grain. The line runs from near Boston through Southeastern Massachusetts and Connecticut, curves round the Housatonic Hills, strikes the vicinity of Saratoga, and runs in a northwesterly direction to Lake Ontario; thence including all our territory east of Lake Michigan, traverses a small section of Southwestern Indiana, strikes nearly west through the northern line of Missouri, crosses the Missouri at Saint Joseph, and gradually curves southward in Kansas as higher elevation is reached. The general direction from ocean to lakes is northwest, from lakes to the Rocky Mountains west-southwest. The line of northern limit of sorghum, on the contrary, preserves with a degree of uniformity a northwestern course. The difference is, sorghum is a summer crop, and its cultivation follows the summer isothermal line; while winter-wheat depends not only on winter and spring climates, but to some extent on the nature of the soil and methods of cultivation.

The sea-island-cotton line skirts the coast from Charleston to Galveston; and the upland line runs from Norfolk southwesterly, curving around the mountain-spurs of Upper Georgia, cutting the northeastern section of Alabama, and thence sharply northward to include the Tennessee Valley and Western Tennessee, and all but the hill region of Arkansas, and southwestwardly through a corner of the Indian Territory and Texas to the Rio Grande.

Accompanying this chart is an estimate of the extent of cultivation of the principal crops, as follows:

	Acres.	Acres.
Area, in 1875, in cereal crops		87,000,000
Of which in maize	44,800,000	
Of which in wheat	26,400,000	
Area, in 1875, in hay-crops		23,500,000
Area, in 1875, in cotton		10,750,000
Area, in 1875, in orchards, vines, and fruits		4,500,000
Area, in 1875, in tobacco		560,000
Total area in cultivation in 1875		133,000,000

The following statement of grand areas, in square miles, is also given:

	Square miles.
Area, including water-surface	4,000,000
Area of States and Territories	3,611,889
Area of the thirteen original States	341,756
Area of public-land States and Territories	2,867,185
Area of public land unsold in 1870	2,168,331
Area of farm-lands in 1869	637,086
Area of farm-lands improved	295,189
Area of farm-lands in forest	248,922

8. Showing the peculiarities of the agriculture of the Pacific coast region, and the local distribution and prominence of the principal crops.

9. Small lithographic map, uniform in size with the diagrams and statistical charts, showing the proportion of improved lands to farm areas.

10. Similar to the above in chromo-lithograph, illustrating the prices of farm-labor in the several States.

11. Map in chromo-lithograph, showing the distribution of fruit areas, and local prominence of principal fruits.

12. Chromo-lithographic map, showing the distribution of milch-cows in the States and Territories, with local comparisons of average annual production.

This map represents by five degrees of density the average annual product per cow in the several States. The first tint including those States in which the average product is less than 200 gallons, is used for South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Arkansas, Indian Territory; the second, under 250 gallons, Virginia, North Carolina, Tennessee, Missouri, Colorado, Wyoming, Montana, Washington, Idaho, Nevada, Utah; the third, under 300 gallons, Delaware, Maryland,

West Virginia, Kentucky, Kansas, Nebraska, Dakota, Oregon; the fourth, under 375 gallons, Maine, New Hampshire, New Jersey, Pennsylvania, Indiana, Illinois, Wisconsin, Minnesota, Iowa, California; the fifth, between 375 and 450 gallons, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Ohio, Michigan. The local distribution is indicated by figures representing the number of cows to each hundred inhabitants of the several States.

DIAGRAMS.

A tangible measure of numbers expressing quantities and areas of differing magnitude is found a necessity to many and a convenience to all in the illustration of the agricultural statistics of the country. In no branch of the Centennial exhibits are the arts of coloring and mathematical drawing more appropriate or more usefully employed than in the illustration of the abstract ideas of political economy and statistical science. The diagrams presented in this exhibit are as follows:

13. Corn and wheat production; average of the period 1870-'74.

This diagram is designed to show the abundance of our supplies of breadstuffs, and especially the immense production of maize, the great crop of the United States, superior in money-value to any other, unless we add to the hay-crop the gross product utilized by farm animals. This diagram is also presented among the exhibits in chart form, 7 feet 6 inches in height and 4 feet 6 inches wide, on a scale of three-fourths of a million bushels to the square inch. It is a striking exhibit, especially to foreigners unfamiliar with the immensity of our cereal production, and the comparatively small proportion of the whole sent abroad, showing the exports in whole and manufactured form, seed used, and home consumption. It is an average of the five crops since the census, not including that of 1875, which would have increased materially the corn average. The average product of corn, in excess of the export, is almost exactly 24 bushels for this period; average area in cultivation, 37,699,803; the yield per acre, 26.3 bushels. A little is imported from Canada, averaging 68,864 bushels. The averages are thus obtained from the yearly estimates:

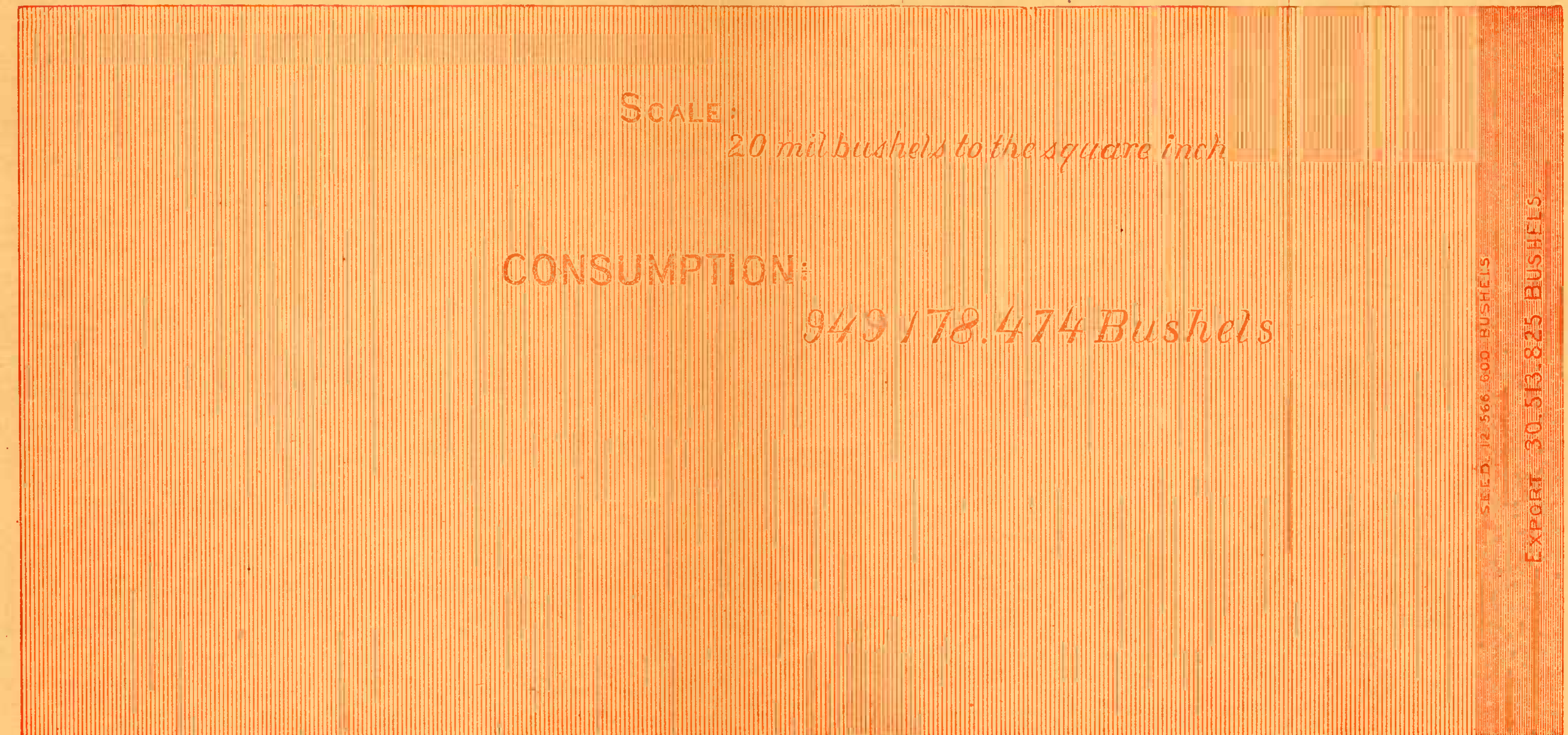
Years.	Production.	Consumption.	Seed.	Export.	
				Corn as meal.	Corn.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1870	1, 094, 255, 000	1, 070, 695, 802	12, 882, 325	850, 564	9, 826, 309
1871	991, 898, 000	994, 807, 278	11, 363, 712	1, 235, 260	34, 491, 650
1872	1, 092, 719, 000	1, 040, 722, 348	11, 842, 278	1, 612, 444	38, 541, 930
1873	932, 274, 000	883, 222, 450	13, 065, 716	1, 551, 228	34, 434, 606
1874	850, 148, 500	806, 444, 492	13, 678, 972	1, 166, 616	28, 858, 420
Total	4, 961, 294, 500	4, 745, 892, 370	62, 833, 003	6, 416, 212	146, 152, 915
Average	992, 258, 900	949, 178, 474	12, 566, 601	1, 283, 242	29, 230, 583

The average supply of wheat in excess of export is 5 bushels; area in cultivation (average for five years) 21,386,709; yield per acre, 12.2 bushels. The imports of wheat have averaged 1,502,541 bushels, of which about three-tenths have been exported. The wheat figures are as follows:

Years.	Production.	Consumption.	Seed.	Export.	
				Wheat.	Wheat as flour.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*	*Bushels.*
1870	235, 884, 700	154, 821, 703	28, 488, 886	34, 304, 906	18, 269, 205
1871	230, 722, 400	161, 810, 806	29, 915, 839	26, 423, 080	12, 572, 675
1872	249, 997, 100	166, 694, 847	31, 287, 538	39, 204, 285	12, 810, 430
1873	280, 372, 700	155, 735, 041	33, 127, 261	71, 039, 928	20, 470, 470
1874	308, 102, 700	197, 849, 555	37, 450, 540	53, 047, 175	19, 755, 430
Total	1, 305, 079, 600	836, 911, 952	160, 270, 064	224, 019, 374	83, 878, 210
Average	261, 015, 920	167, 382, 390	32, 054, 013	44, 803, 875	16, 775, 642

CORN AND WHEAT PRODUCTION.

CORN.—Average, 1870–1874, 992,258,900 bushels.



WHEAT.—Average, 1870–1874, 261,015,920 bushels.

14. The product of corn per capita.

The number of bushels produced in 1869 to each inhabitant is indicated by heavy perpendicular bars crossing horizontal lines which mark each five bushels of the scale. The great disparity in the production of the several States is strikingly shown by the differing height of these indices, only one of the New England States (Vermont) reaching the first line of five bushels, and California, Oregon, and Nevada also fall below it. The Southern States vary from ten to twenty bushels, and those of the Ohio Valley from twenty-five to fifty-seven, Iowa standing in the highest rank. The figures on which the diagram are based are as follows:

States.	Population.	Corn.	States.	Population.	Corn.
		Bushels.			*Bushels.*
Alabama	996, 992	16, 977, 948	Nebraska	122, 993	4, 736, 710
Arkansas	484, 471	13, 382, 145	Nevada	42, 491	9, 660
California	560, 247	1, 221, 222	New Hampshire	318, 300	1, 277, 768
Connecticut	537, 454	1, 570, 364	New Jersey	906, 096	8, 745, 384
Delaware	125, 015	3, 010, 390	New York	4, 382, 759	16, 462, 825
Florida	187, 748	2, 225, 056	North Carolina	1, 071, 361	18, 454, 215
Georgia	1, 184, 109	17, 646, 459	Ohio	2, 665, 260	67, 501, 144
Illinois	2, 539, 891	129, 921, 395	Oregon	90, 923	72, 138
Indiana	1, 680, 637	51, 094, 538	Pennsylvania	3, 521, 951	34, 702, 006
Iowa	1, 194, 020	68, 935, 065	Rhode Island	217, 353	311, 957
Kansas	364, 399	17, 025, 525	South Carolina	705, 606	7, 614, 207
Kentucky	1, 321, 011	50, 091, 006	Tennessee	1, 258, 520	41, 343, 614
Louisiana	726, 915	7, 596, 628	Texas	818, 579	20, 554, 538
Maine	626, 915	1, 089, 888	Vermont	330, 551	1, 699, 882
Maryland	780, 894	11, 701, 817	Virginia	1, 225, 163	17, 649, 304
Massachusetts	1, 457, 351	1, 397, 807	West Virginia	442, 014	8, 197, 865
Michigan	1, 184, 059	14, 086, 238	Wisconsin	1, 054, 670	15, 033, 998
Minnesota	439, 706	4, 743, 117			
Mississippi	827, 922	15, 637, 316	Total	38, 115, 641	759, 826, 214
Missouri	1, 721, 295	66, 034, 075			

It will be remembered that this was a year of very deficient yield of corn. Illinois, which stands second in proportion to population, had less than two-thirds of a full crop. A diagram for 1875 would differ very materially. Illinois and most of the States west of the Mississippi would nearly or quite double the present rate per head, and require several additional "stories" in the structure of the diagram.

15. Product of wheat per capita.

This diagram shows a still greater disproportion in the product of wheat, seventeen States failing to produce a full supply of the home demand. All of these are east of Ohio and south of the Ohio River, and but four States in this large district are not required to go beyond their boundaries for bread, viz, Pennsylvania, Delaware, Maryland, and Virginia. The following is a statement of the crop of each State and the number of bushels to each inhabitant:

States.	Wheat.	No. of bushels to each inhabitant.	States.	Wheat.	No. of bushels to each inhabitant.
	Bushels.			*Bushels.*	
Alabama	1, 055, 068	1. 05	Missouri	14, 315, 926	8. 31
Arkansas	741, 736	1. 53	Nebraska	2, 125, 086	17. 28
California	16, 676, 702	29. 76	Nevada	228, 866	5. 39
Connecticut	38, 144	. 07	New Hampshire	193, 621	. 60
Delaware	895, 477	7. 16	New Jersey	2, 301, 433	2. 54
Florida	....	......	New York	12, 178, 472	2. 77
Georgia	2, 127, 017	1. 79	North Carolina	2, 859, 879	2. 66
Illinois	30, 128, 405	11. 86	Ohio	27, 882, 159	10. 46
Indiana	27, 747, 222	16. 51	Oregon	2, 340, 746	25. 75
Iowa	29, 435, 692	24. 65	Pennsylvania	19, 672, 877	5. 58
Kansas	2, 391, 198	6. 56	Rhode Island	784	. 00. 3
Kentucky	5, 728, 704	4. 33	South Carolina	783, 610	1. 11
Louisiana	9, 906	. 01. 3	Tennessee	6, 188, 916	4. 91
Maine	278, 793	. 44	Texas	415, 112	. 50
Maryland	5, 774, 503	7. 39	Vermont	454, 703	1. 37
Massachusetts	34, 648	. 02. 3	Virginia	7, 398, 787	6. 03
Michigan	16, 265, 773	13. 73	West Virginia	2, 483, 543	5. 61
Minnesota	18, 866, 073	42. 90	Wisconsin	25, 606, 344	24. 28
Mississippi	274, 479	. 33			

16. Area of wheat, with proportion sown and drilled respectively.

This figure is based on results of investigation by the statistical division. It omits the New England States, which produce little wheat, nearly all of which is sown broadcast. The wheat-area in New York is divided equally between the two methods. In New Jersey, Pennsylvania, Delaware, and Maryland the drill greatly predominates. In the Southern States the area is small, particularly in the cotton States, and the drill is comparatively unknown. North of the Ohio River, in the winter-wheat States, the drill is very generally used, the proportion rising to 76 per cent. in Illinois. In the spring-wheat region there are several reasons for prominence of broadcasting. One comes from a prevalent practice of sowing wheat on the irregular surface of a corn-field without plowing; another is found in the use of the combined cultivator and broadcast-seeder, which destroys many of the weeds that would otherwise be left between the drills. The gist of both of these reasons lies in the saving of labor by a compromise process, which is cheap though slovenly. The result of the investigation shows that 47 per cent. of the winter-wheat, and 30 of the spring, or 37 of both, represent the proportion seeded by the drill. The improvement by drilling is made to average 10 per cent. The average quantity of seed used for seeding winter-wheat is 1.35 bushels per acre; 1.24 for drilled, 1.44 for the sown. The details are as follows:

States.	Proportion sown.	Proportion drilled.	Increase of product by drilling.	Seed per acre. Bushels in broadcasting.	Seed per acre. Bushels in drilling.
	Per cent.	*Per cent.*	*Per cent.*		
New York	50	50	13	1.80	1.60
New Jersey	45	55	6	1.95	1.60
Pennsylvania	30	70	12	1.74	1.49
Delaware	26	74	10	1.75	1.50
Maryland	24	76	7	1.70	1.43
Virginia	62	38	12	1.44	1.21
North Carolina	97	3	....	1.07	.83
South Carolina	99	1	....	1.00	.70
Georgia	99	1	....	1.00	.90
Alabama	99	1	....	1.00	....
Mississippi	99	1	....	1.25	....
Texas	98	2	....	1.18	.90
Arkansas	100	....	....	1.10	....
Tennessee	96	4	10	1.20	1.10
West Virginia	58	42	12	1.53	1.33
Kentucky	92	8	10	1.36	1.11
Ohio	39	61	16	1.57	1.33
Michigan	49	51	9	1.62	1.40
Illinois	24	76	19	1.52	1.24
Indiana	49	51	15	1.48	1.21
Missouri	62	38	21	1.52	1.21
Kansas	55	45	16	1.49	1.23
Nebraska	51	49	17	1.56	1.25
California	98	2	....	1.33	....
Oregon	81	19	5	1.50	1.21

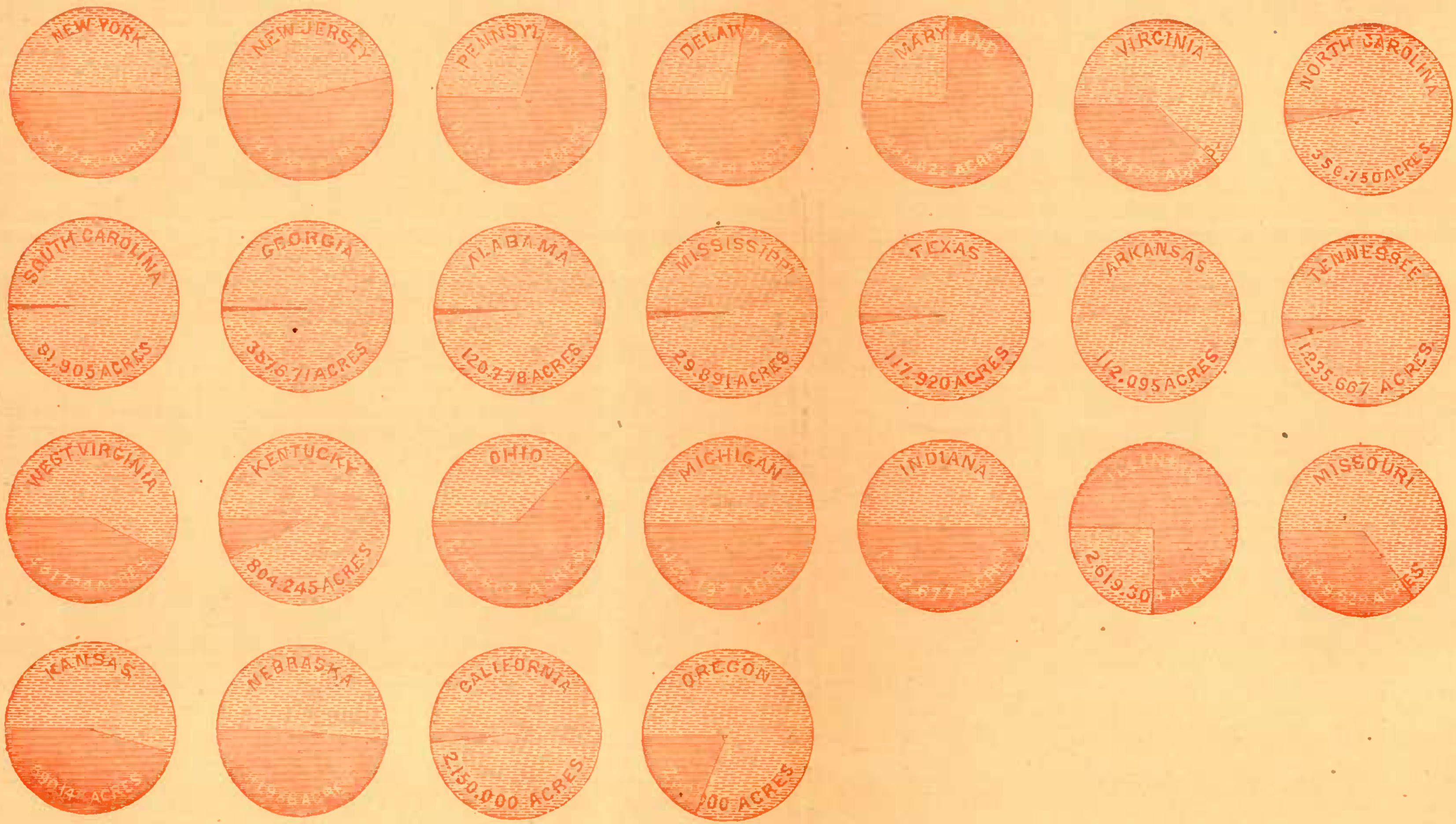
17. Corn and wheat exports of fifty years, 1825 to 1875.

The light space on the right of the diagram represents the volume of wheat, the darker shade the flour in its equivalent of bushels of wheat. On the left, corn in bushels is shown, and the darker stripe gives the equivalent of the corn-meal exports. It will be seen that the first half of the period is credited with less than a fifth of the wheat-exports; and that the aggregate of the last quarter of the period is equal to the total shipment of the preceding three-quarters. A striking feature of the diagram is the remarkable increase in the export of whole wheat. For many years scarcely an appreciable quantity, it increases slowly at first, rapidly after 1860, and at the close of 1875 it nearly equaled the aggregate of wheat exports in the form of flour. It is a striking fact, exhibited in this drawing, that the exports of unmanufactured wheat were greater in 1874 than in a period of thirty-five years from 1825 to 1860. In the same year the exports of flour were nearly equal to the aggregate exports of five years from 1825 to 1830. The exports of corn in 1873 equaled the aggregate shipments to foreign countries for twenty-three years from 1825. The exports of corn-meal have not been increased in an equal degree. The following tables present the data required in the construction of this figure, barrels of flour and of corn-meal having been previously reduced to their equivalent in bushels of grain, stated for periods of five years until 1870, and yearly for the next five years.

AREA OF WHEAT.

Plate III.

PROPORTION SOWN AND DRILLED RESPECTIVELY.



Quantity of exports of wheat and flour.

Year.	Wheat.		Flour.		Total wheat and flour.	
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1830	125, 547		23, 259, 700		23, 385, 247	
1835	614, 145		26, 209, 820		26, 823, 965	
		739, 692		49, 469, 520		50, 209, 212
	739, 692		49, 469, 520		50, 209, 212	
1840	1, 842, 841		20, 464, 660		22, 307, 501	
		2, 582, 533		69, 934, 180		72, 516, 713
	2, 582, 533		69, 934, 180		72, 516, 713	
1845	2, 946, 861		31, 373, 485		34, 320, 346	
		5, 529, 394		101. 307, 665		106, 837, 059
	5, 529, 394		101, 307, 665		106, 837, 059	
1850	10, 184, 645		61, 424, 140		71, 608, 785	
		15, 714, 039		162, 731, 805		178, 445, 844
	15, 714, 039		162, 731, 805		178, 445, 844	
1855	16, 446, 955		65, 747, 590		82, 194, 545	
		32, 160, 994		228, 479, 395		260, 640, 389
	32, 160, 994		228, 479, 395		260, 640, 389	
1860	38, 808, 573		78, 891, 340		117, 699, 913	
		70, 969, 567		307, 370, 735		378, 340, 302
	70, 969, 567		307, 370, 735		378, 340, 302	
1865	138, 306, 907		98, 788, 665		237, 095, 572	
		200, 276, 474		406, 159, 400		615, 435, 874
	209, 276, 474		406, 159, 400		615, 435, 874	
1870	81, 808, 364		57, 273, 925		139, 082, 289	
		291, 084, 838		463, 433, 325		754, 518, 163
	291, 084, 838		463, 433, 325		754, 518, 163	
1871	34, 304, 906		18, 269, 205		52, 574, 111	
		325, 389, 744		481, 702, 530		807, 092, 274
	325, 389, 744		481, 702, 530		807, 092, 274	
1872	26, 423, 080		12, 572, 675		38, 995, 755	
		351, 812, 824		494, 275, 205		846, 088, 029
	351, 812, 824		494, 275, 205		846, 088, 029	
1873	39, 204, 285		12, 810, 430		52, 014, 715	
		391, 017, 109		507, 085, 635		898, 102, 744
	391, 017, 109		507, 085, 685		898, 102, 744	
1874	71, 039, 928		20, 470, 470		91, 510, 398	
		462, 057, 037		527, 556, 105		989, 613, 142
	462, 057, 037		527, 556, 105		989, 613, 142	
1875	53, 047, 175		19, 755, 430		72, 802, 605	
		515, 104, 212		547, 311, 535		1, 062 415, 747
	515, 104, 212		547, 311, 535		1, 062, 415, 747	

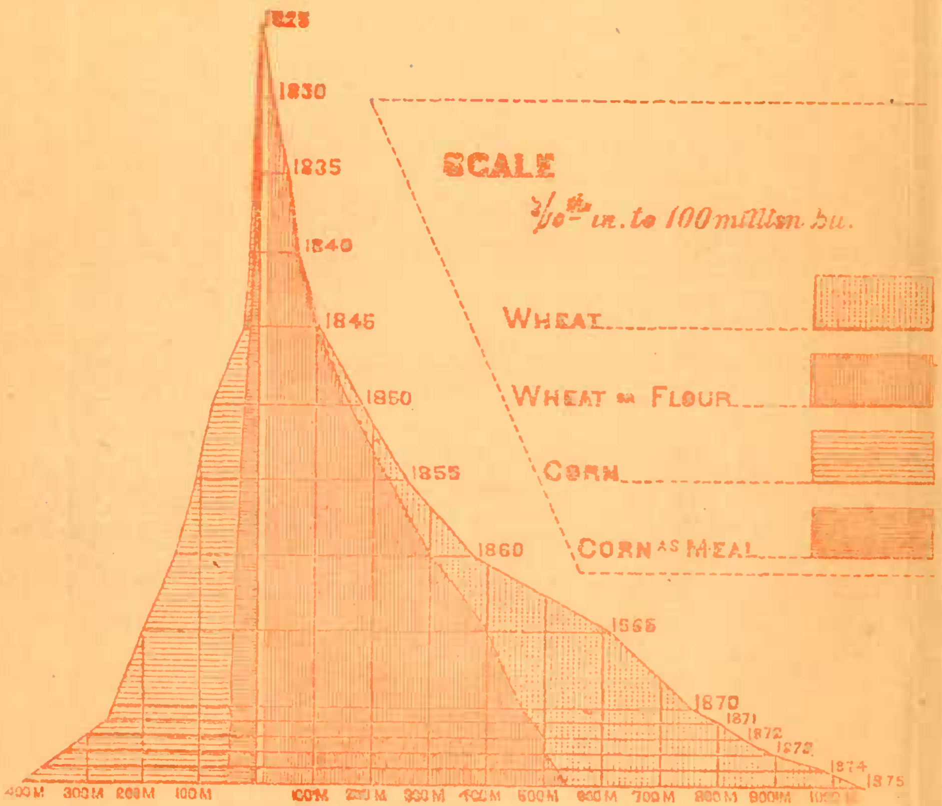
Value of exports of wheat and flour.

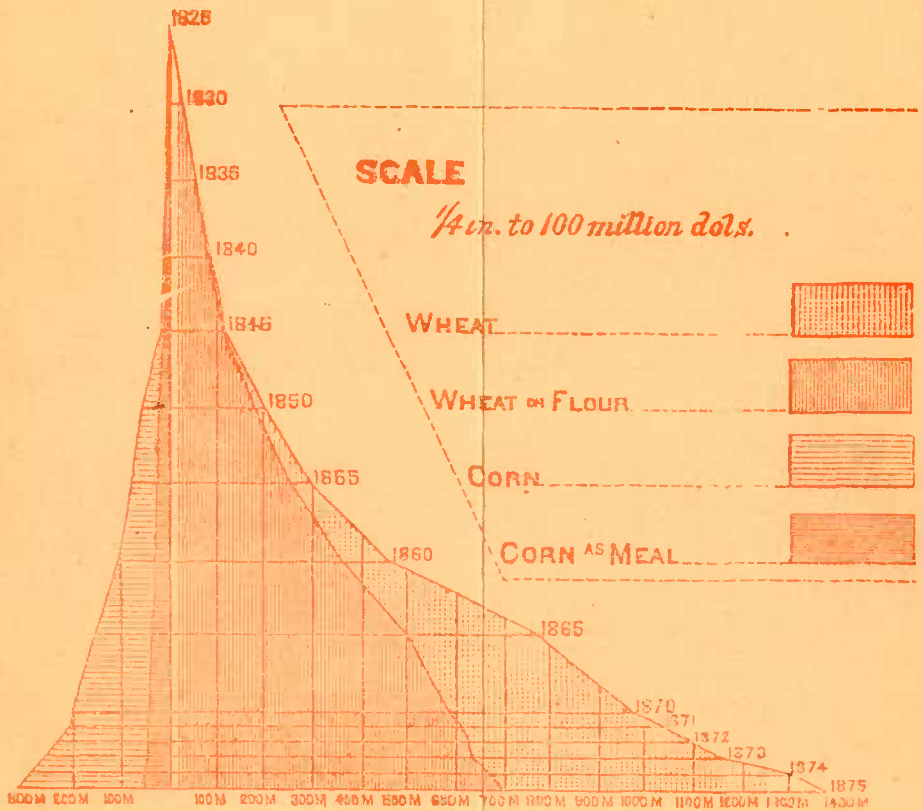
Year.	Wheat.		Flour.		Total value of wheat and flour.
	Value.	Value.	Value.	Value.	
1830	$112,754		$24,708,090		$24,820,844
1835	737,365		29,347,649		
		$850,119		$54,055,739	54,905,858
	850,119		54,055,739		
1840	1,817,067		27,231,952		
		2,667,186		81,287,691	83,954,877
	2,667,186		81,287,691		
1845	2,900,785		31,056,156		
		5,567,971		112,343,847	117,911,818
	5,567,971		112,343,847		
1850	12,801,093		69,375,741		
		18,369,064		181,719,588	200,088,652
	18,369,064		181,719,588		
1855	21,864,762		75,775,220		
		40,233,826		257,494,808	297,728,634
	40,233,826		257,494,808		
1860	53,343,918		104,368,446		
		93,577,744		361,863,254	455,440,998
	93,577,744		361,863,254		
1865	178,470,444		133,356,875		
		272,048,188		495,220,129	767,268,317
	272,048,188		495,220,129		
1870	117,527,424		92,071,717		
		389,575,612		587,291,846	976,867,458
	389,575,612		587,291,846		
1871	45,143,424		24,093,184		
		434,719,036		611,385,030	1,046,104,066
	434,719,036		611,385,030		
1872	38,915,060		17,955,684		
		473,634,096		629,340,714	1,102,974,810
	473,634,096		629,240,714		
1873	51,452,254		19,381,664		
		525,086,350		648,722,378	1,163,808,728
	525,086,350		648,722,378		
1874	101,421,459		29,258,094		
		626,507,809		677,980,472	1,304,488,281
	626,507,809		677,980,472		
1875	59,607,863		23,710,074		
		686,115,672		701,690,546	1,387,806,218
	686,115,672		701,690,546		

Plate IV.

CORN AND WHEAT EXPORTS OF FIFTY YEARS.

1825 to 1875.





Quantity of exports of corn and corn-meal.

Year.	Corn.		Corn-meal.		Total.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.
1830	3, 530, 710	....	3, 133, 632	....	6, 664, 342
1835	2, 568, 946	....	3, 269, 532		
		6, 099, 656		6, 403, 164	12, 502, 820
	6, 099, 656		6, 403, 164		
1840	1, 184, 973	....	3, 375, 720		
		7, 284, 629		9, 778, 884	17, 063, 513
	7, 284, 629		9, 778, 884		
1845	3, 474, 109	....	4, 530, 996		
		10, 758, 738		14, 309, 880	25, 068, 618
	10, 758, 738		14, 309, 880		
1850	43, 822, 153	....	9, 974, 800		
		54, 580, 891		24, 284, 680	78, 865, 571
	54, 580, 891		24, 284, 680		
1855	23, 905, 196	....	4. 485, 824		
		78, 486, 087		28, 770, 504	107, 256, 591
	78, 486, 087		28, 770, 504		
1860	27, 597, 896	....	5, 165, 368		
		106. 083, 983		33, 935, 872	140, 019, 855
	106, 083, 983		33, 935, 872		
1865	52, 612, 028	....	4, 706, 428		
		158, 696, 011		38, 642, 300	197, 338, 311
	158, 696, 011		38, 642, 300		
1870	47, 993, 276	....	5. 420, 096		
		206, 689, 287		44, 062, 396	250, 751, 683
	206, 689, 287		44, 062, 396		
1871	9, 826, 309	....	850, 564		
		216, 515, 596		44, 912, 960	261, 428, 556
	216, 515, 596		44, 912, 960		
1872	34, 491, 650	....	1, 235, 360		
		251, 007, 246		46, 148, 320	297, 155, 566
	251, 007, 246		46, 148, 320		
1873	38, 541, 930	....	1, 612, 444		
		289, 549, 176		47, 760, 764	337, 309, 940
	289, 549, 176		47, 760, 764		
1874	34, 434, 606	....	1, 551, 228		
		323, 983, 782		49, 311, 992	373, 295, 774
	323, 983, 782		49, 311, 992		
1875	28, 858, 420	....	1, 166, 616		
		352, 842, 202		50, 478, 608	403, 320, 810
	352, 842, 202		50, 478, 608		

Value of exports of corn and corn-meal.

Year.	Corn.		Corn-meal.		Total value of corn and corn-meal.	
	Value.	Value.	Value.	Value.		
1830	$2,019,926		$2,404,371		$4,424,297	
1835	1,804,711		2,731,077		4,535,788	
		$3,824,637		$5,135,448		$8,960,085
	3,824,637		5,135,448		8,960,085	
1840	873,104		3,471,215		4,344,319	
		4,697,741		8,606,663		13,304,404
	4,697,741		8,606,663		13,304,404	
1845	1,755,602		3,037,021		4,792,623	
		6.453.343		11,643,684		18,097,027
	6,453,343		11,643,684		18,097,027	
1850	31,277,920		8,984,252		40,262,172	
		37,731,263		20,627,936		58,359,199
	37,731,263		20,627,936		58,359,199	
1855	17,712,699		4,147,318		21,860,017	
		55,443.962		24,775,254		80,219,216
	55,443,962		24,775,254		80,219,216	
1860	19,789,181		4,917,515		24,706,696	
		75,233,143		29,692,769		104,925,912
	75,233,143		29,692,769		104,925,912	
1865	34,903,365		5,323,270		40,226,635	
		110,136,508		35,016,039		145,152,547
	110,136,508		35,016,039		145,152,547	
1870	47,143,817		7,345,448		54,488,265	
		157,280,325		42,361,487		199,641,812
	157,280,325		42,361,487		199,641,812	
1871	7,458,997		951,830		8,410,827	
		164,739,322		43,313,317		208,052,639
	164,739,322		43,313,317		208,052,639	
1872	23,984,365		1,214,999		25,199,364	
		188,723,687		44,528,316		233,252,003
	188,723,687		44,528,316		233,252,003	
1873	23,794,694		1,474,827		25,269,521	
		212,518,381		46,003,143		258,521,524
	212,518,381		46,003,143		258,521,524	
1874	24,769,951		1,529,399		26,299,350	
		237,288,332		47,532,542		284,820,874
	237,288,332		47,532,542		284,820,874	
1875	24,456,937		1,290,533		25,747,470	
		261,745.269		48,823,075		310,568,344
	261,745,269		48,823,075		310,568,344	

18. Sugar-supply of twenty-five years, with a comparison of quantities, native and foreign.

This diagram represents the annual production of Louisiana, together with the imports entering annually into consumption, by means of separate tints of color, on the scale of 200,000,000 pounds per inch. It shows that in 1850 half the requisite supplies were produced in Louisiana; now, from the vast increase in consumption and decrease in production, less than one-tenth of our wants are supplied at home.

19. The cotton crop of ten years—effect of quantity upon value.

The quantity and value of each crop are here placed in juxtaposition, in line exhibits of differing tints, one inch in length, indicating in one case a half-million bales, in the other $50,000,000. It shows that a very large crop fails to yield as much money as a medium one; that when, for example, the quantity rose from 3,154,946 bales in 1869 to 4,352,317 bales in 1870, the price declined from 23.6 to 14.9 cents, so that the large crop brought $44,673,491 less than the medium crop preceding. The next year the crop declined to 2,974,351 bales, and the price rose to 19.3 cents. The high price of the first year was, of course, the result of the cotton-famine of the war-period.

20. Average rate of yield of corn and wheat per acre.

The estimates of area in certain crops and of average yield per acre, taken together for a period of several years, furnish means of obtaining a far truer idea of local rates of yield than the fluctuating averages of separate years. For instance, Ohio, a wheat-growing State of much prominence, has had an annual average yield of wheat of less than six bushels, and again an average of more than sixteen. These averages are not necessarily indices of fertility of soil, as Massachusetts, utterly insignificant in corn-production, stands far higher than Illinois. Fertilizers and special culture give larger results per

Plate V.

SUGAR SUPPLY OF TWENTY-FIVE YEARS.

Comparison of Domestic and Foreign.

	Louisiana.	Total.
1850	242,881,150	443,908,572
1851	272,029,050	642,792,597
1852	370,224,100	815,663,455
1853	505,222,600	944,814,232
1854	398,630,250	792,610,363
1855	266,141,050	695,021,736
1856	85,072,400	597,638,166
1857	321,651,550	1,078,450,344
1858	416,640,400	853,994,264
1859	255,116,000	870,540,053
1860	263,071,700	919,346,722
1861	528,321,500	1,251,620,551
1862		530,832,412
1863		498,846,005
1864	7,668,200	611,284,468
1865	17,250,000	594,330,143
1866	47,150,000	1,012,799,904
1867	43,294,050	870,526,017
1868	96,894,400	1,195,120,413
1869	100,153,500	1,309,847,125
1870	166,613,150	1,306,202,065
1871	147,730,150	1,327,456,300
1872	124,798,000	1,565,760,616
1873	102,922,700	1,525,794,971
1874	134,504,691	1,705,193,954
	4,913,980,591	23,960,395,437

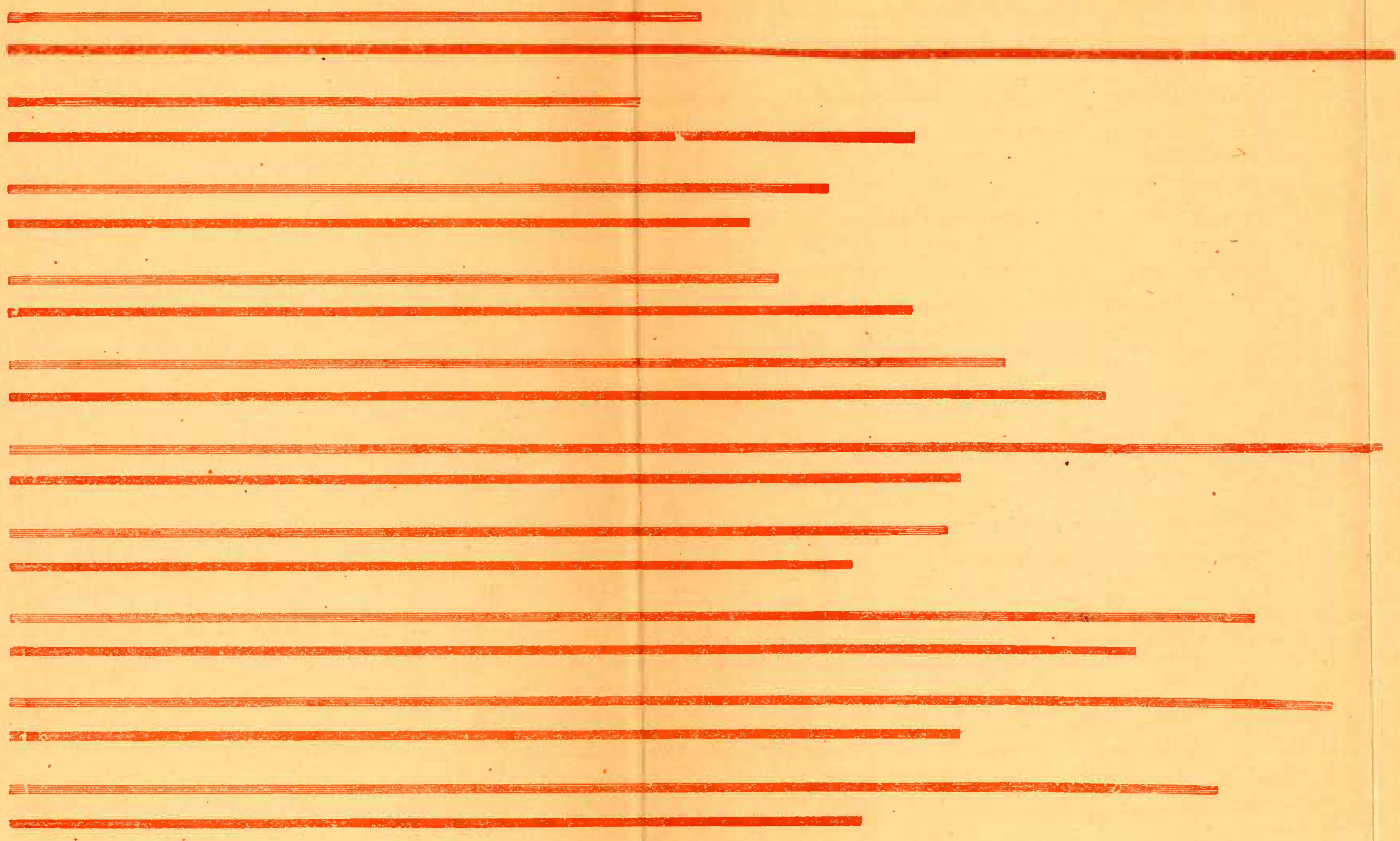
Plate VI.

THE COTTON CROP OF TEN YEARS.

Effect of Quantity upon Value.

SCALE.

Light lines, 1 inch to ½ million bales.
Dark lines, 1 inch to 50 million dolls.



	QUANTITY.	VALUE.
1865.	2,193,987 bales.	$440,728,108 @ 43.2c.
1866.	2,019,774 bales.	$285,515,25[illegible] @ 30.4c.
1867.	2,593,993 bales.	$234,004,108 @ 19.4c.
1868.	2,439,039 bales.	$285,806,590 @ 25.2c.
1869.	3,154,940 bales.	$346,223,774 @ 23.6c.
1870.	4,352,317 bales.	$301,550,283 @ 14.9c.
1871.	2,974,351 bales.	$266,933,130 @ 19.3c.
1872.	3,930,508 bales	$345,432,695 @ 18.9c.
1873.	4,170,388 bales.	$300,580,715 @ 15.5c.
1874.	3,832,991 bales.	$269,133,463 @ 15.1c.

acre than the richest soils. Illinois probably stands lower for this period of nine years than for any former period, having suffered for several seasons of drought and other unpropitious meteorological conditions. The average yields of corn and wheat are as follows:

1. CORN.

38.2 to 35.2 bushels:
- California.
- New Jersey.
- Vermont.
- Ohio.
- New Hampshire.
- Pennsylvania.

34.7 to 32.1:
- Massachusetts.
- Iowa.
- Nebraska.
- Kansas.
- Minnesota.
- Indiana.

31.2 to 30.1:
- New York.
- Wisconsin.
- Connecticut.
- Nevada.
- Michigan.
- Missouri.

29.9 to 25.9:
- Oregon.
- Illinois
- Maine.
- Kentucky.
- West Virginia.
- Rhode Island.
- Arkansas.

24.5 to 22.8:
- Maryland.
- Tennessee.
- Texas.

19.9 to 16.1:
- Virginia.
- Delaware.
- Louisiana.
- Mississippi.

14.2 to 9.6:
- North Carolina.
- Alabama.
- Georgia.
- Florida.
- South Carolina.

2. WHEAT.

20.9 to 15.2 bushels:
- Nevada.
- Oregon.
- Massachusetts.
- Connecticut.
- Vermont.
- Rhode Island.
- Minnesota.

14.8 to 14.0:
- New Hampshire.
- Kansas.
- New Jersey
- New York.

13.7 to 13.0:
- California.
- Wisconsin.
- Michigan.
- Pennsylvania.
- Maine.
- Texas.

12.4 to 12.1:
- Nebraska.
- Iowa.
- Missouri.

11.8 to 11.4:
- Illinois.
- Ohio.

10.9 to 10.1:
- Indiana.
- Delaware.
- Maryland.
- Arkansas.
- West Virginia.

9.3 to 8.3:
- Kentucky.
- Mississippi.
- Louisiana.
- Florida.
- Virginia.

7.7 to 6.0:
- Tennessee.
- Alabama.
- North Carolina.
- Georgia.
- South Carolina.

21. Aggregate value of principal crops, being an average from 1866 to 1874, inclusive.

This diagram is a line-illustration on the scale of 100,000,000 to the inch, which shows that corn leads all our crops, hay next, (grass as pasturage not included,) and wheat and cotton are almost exactly equal. These averages are as follows:

Corn	$549,238,907	Potatoes	$76,356,914
Hay	343,111,450	Tobacco	34,439,809
Wheat	308,983,272	Barley	23,374,788
Cotton	308,590,811	Rye	18,695,826
Oats	123,867,426	Buckwheat	12,943,912

22. Aggregate product of corn, wheat, and potatoes—effect of quantity upon values.

This diagram shows the course of production through eight years. The scale is arranged to illustrate quantities by lines representing one hundred, two hundred, up to thirteen hundred millions of bushels, and when used to illustrate value the same lines mean fifty, one hundred, up to six hundred and fifty millions of dollars. Tracing the line representing corn, starting at less than nine hundred million bushels, it falls one hundred millions in 1869, and at 1870 and 1872, respectively, it nearly reaches eleven hundred millions. Then following the upper line, showing the value of corn, nearly $600,000,000 in 1866—a rise in value attends a decline in quantity, and *vice versa*, the only exception being in 1871, when the surplus of the preceding year made the supply a very full one, while the great crop of 1872 struck with panic the corn-markets, and completely demoralized prices. The prices of corn are controlled almost exclusively by the quantity produced, as the market cannot be "cornered," and the export of 3 per cent. is scarcely a disturbing element; in this instance, foreign demand does not fix the prevailing home-price. With wheat it is different, as the lines show, in some years prices continuing to rise with a rise in quantity, caused by poor crops in Europe.

23. Wages of farm-labor—monthly rate, without board, 1866 and 1875.

This diagram shows the monthly rate of each State, in both the years named, from the exhaustive investigations of the Department. The scale of line-illustrations is $10 per inch. There is shown a decline in wages, except in some of the Southern States, where labor is becoming more efficient and valuable, and in Oregon, where a scarcity exists. The figures are as follows:

States.	1866.	1875.	States.	1866.	1875.
Maine	$27 00	$25 40	Louisiana	$20 50	$18 40
New Hampshire	32 74	28 57	Texas	19 00	19 50
Vermont	32 84	29 67	Arkansas	24 21	20 50
Massachusetts	38 94	31 87	Tennessee	19 00	15 20
Rhode Island	34 40	30 00	West Virginia	25 35	20 75
Connecticut	34 25	28 25	Kentucky	20 23	18 12
New York	29 57	27 14	Ohio	28 46	24 05
New Jersey	32 27	30 71	Michigan	31 26	28 22
Pennsylvania	29 91	25 89	Indiana	27 71	24 20
Delaware	24 93	20 33	Illinois	28 54	25 20
Maryland	20 36	20 02	Wisconsin	30 84	25 50
Virginia	14 82	14 84	Minnesota	31 65	26 16
North Carolina	13 46	13 46	Iowa	28 34	24 35
South Carolina	12 00	12 84	Missouri	26 75	19 40
Georgia	15 51	14 40	Kansas	31 03	23 20
Florida	18 00	15 50	Nebraska	38 37	24 00
Alabama	13 40	13 60	California	45 71	44 50
Mississippi	16 72	16 40	Oregon	35 75	38 25

24. Immigration of seven years, with a comparison of its sources.

In further illustration of the labor interests of the country, this diagram shows the sources of our supply of labor from other countries. The comparison is made upon the scale of 200,000 to the square inch. The total addition to the volume of our population, in this brief period, is 2,531,569 from immigration alone, nearly four-tenths of which has been received from Great Britain, and almost as much from Germany. Though the entire world has made contributions, the States named on the diagram sent all but a small fraction of the volume.

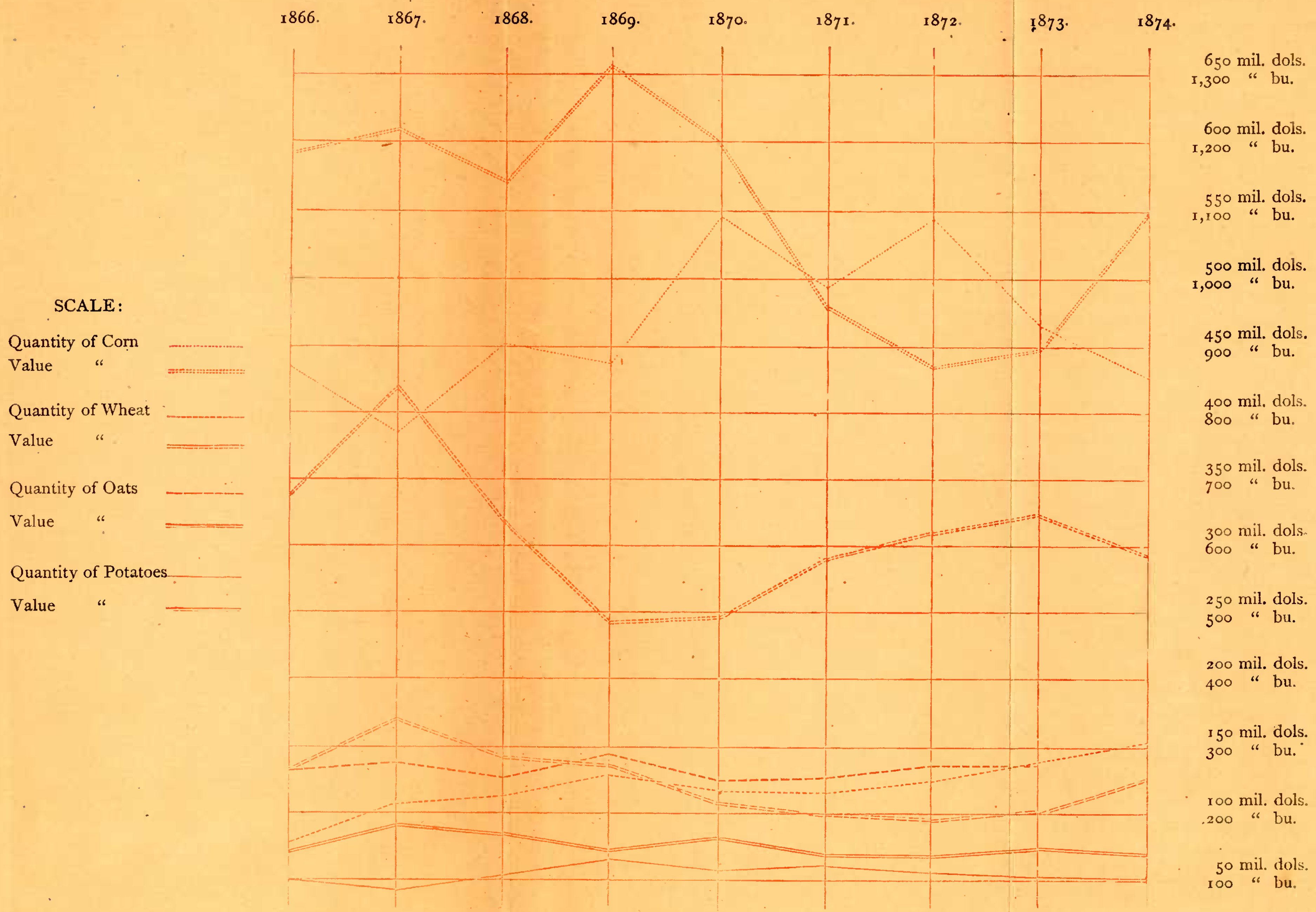
25. Comparative area of the public-land States.

This diagram illustrates the superficial area of each State by square figures, drawn to a scale of 25,000,000 acres per square inch. The proportion surveyed in 1874 is indicated by shading, as is also the area actually appropriated up to 1870, the date of the last official statement by the Land-Office of the lands sold or otherwise conveyed. These figures are as follows:

AGGREGATE PRODUCT OF CORN, WHEAT, OATS, AND POTATOES.

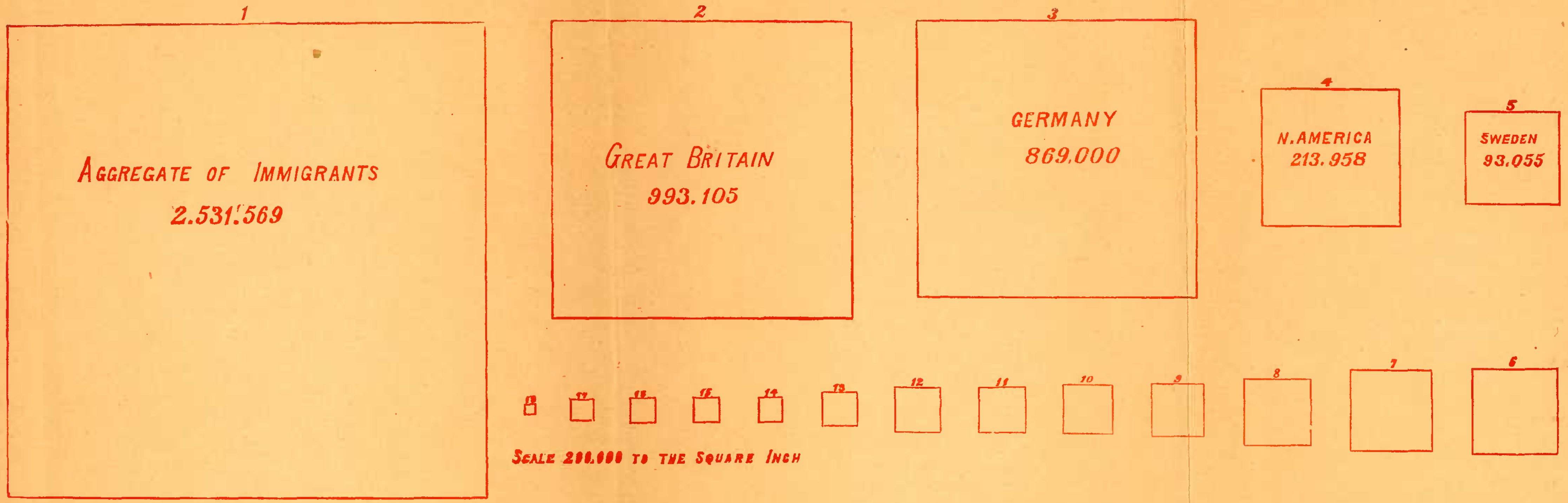
Plate VII.

Effect of Quantity on Value.



IMMIGRATION OF SEVEN YEARS.

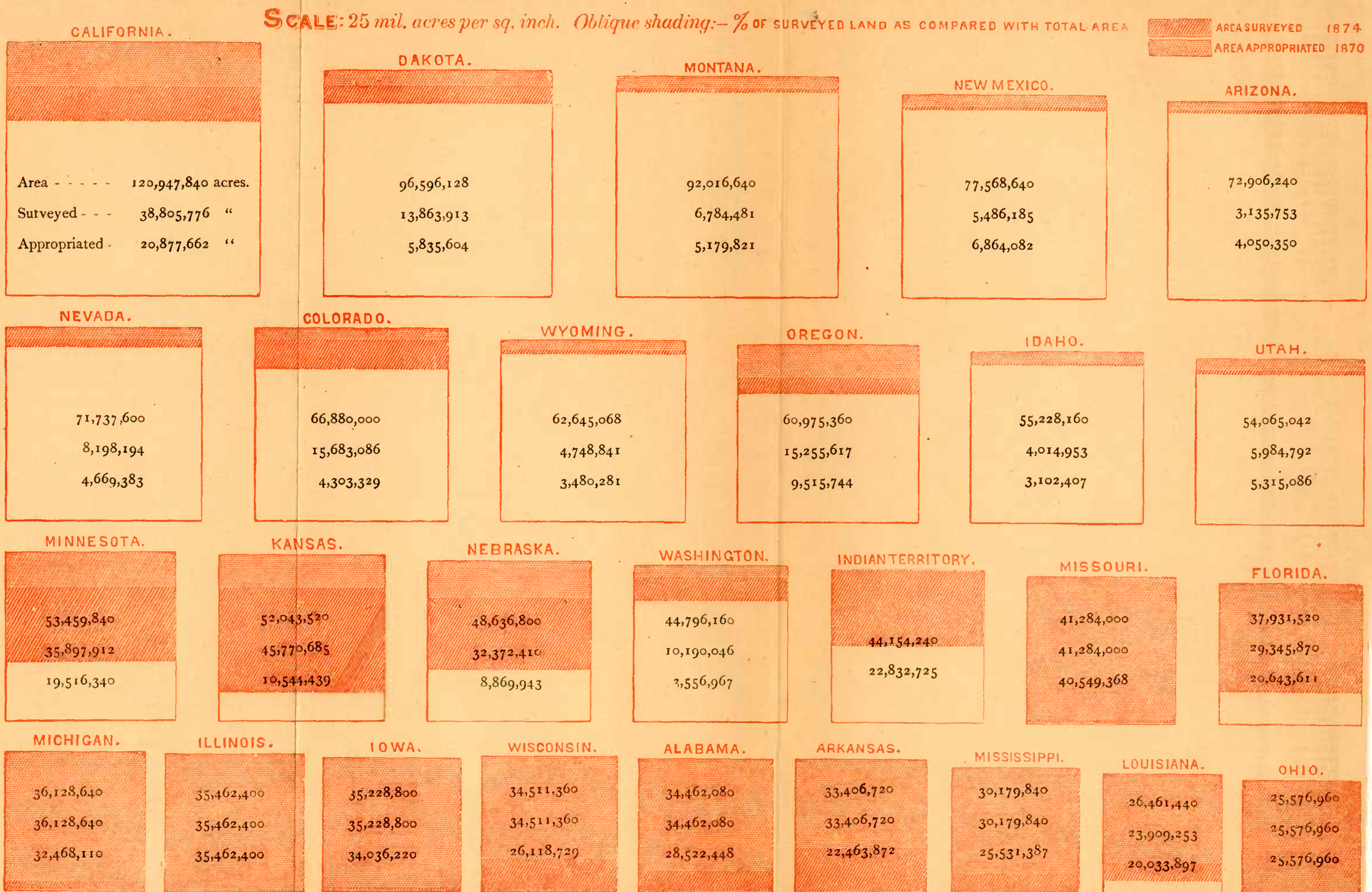
Comparison of its Sources.



1. Aggregate for all countries 2,531,569	7. Asia 76,690	13. Netherlands 12,973
2. Great Britain and Ireland 993,105	8. France 47,252	14. Russia 7,561
3. Germany 869,000	9. Austro-Hungary 27,750	15. Poland 7,370
4. North America 213,958	10. Italy, including Sicily and Malta .. 25,935	16. Belgium 6,847
5. Sweden 93,053	11. Switzerland 23,469	17. Spain 5,005
6. Norway 78,036	12. Denmark 21,977	18. Portugal 1,390

COMPARATIVE AREA OF PUBLIC LAND STATES.

Plate IX.



States and Territories.	Area in acres.	Acres surveyed.	Acres appropriated.
California	120, 947, 840	38, 805, 776	20, 877, 602
Dakota Territory	96, 596, 128	13, 863, 913	5, 835, 604
Montana Territory	92, 016, 640	6, 784, 481	5, 179, 821
New Mexico Territory	77, 568, 640	5, 486, 185	6, 864, 082
Arizona Territory	72, 906, 240	3, 135, 753	4, 050, 350
Nevada	71, 737, 600	8, 198, 194	4, 669, 383
Colorado Territory	66, 880, 000	15, 683, 086	4, 303, 329
Wyoming Territory	62, 645, 068	4, 748, 841	3, 480, 281
Oregon	60, 975, 360	15, 255, 617	9, 515, 744
Idaho Territory	55, 228, 160	4, 014, 953	3, 102, 407
Utah Territory	54, 065, 042	5, 984, 792	5, 315, 086
Minnesota	53, 459, 840	35, 897, 912	19, 516, 340
Kansas	52, 043, 520	45, 770, 685	10, 544, 439
Nebraska	48, 636, 800	32, 372, 410	8, 869, 943
Washington Territory	44, 796, 160	10, 190, 046	3, 556, 967
Indian Territory	44, 154, 240	22, 832, 725	....
Missouri	41, 284, 000	41, 284, 000	40, 549, 368
Florida	37, 931, 520	29, 345, 870	20, 643, 611
Michigan	36, 128, 640	36, 128, 640	32, 468, 110
Illinois	35, 462, 400	35, 462, 400	35, 462, 400
Iowa	35, 228, 800	35, 228, 800	34, 036, 220
Wisconsin	34, 511, 360	34, 511, 360	26, 118, 729
Alabama	34, 462, 080	34, 462, 080	28, 522, 448
Arkansas	33, 406, 720	33, 406, 720	22, 463, 872
Mississippi	30, 179, 840	30, 179, 840	25, 531, 387
Louisiana	26, 461, 440	23, 909, 253	20, 033, 897
Ohio	25, 576, 960	25, 576, 960	25, 576, 960

26. Aggregate value of farm animals—average from 1866 to 1874, inclusive.

This diagram represents these values as follows: Cattle, $646,214,801; horses, $600,782,233; mules, $108,033,293; swine, $146,417,611; sheep, $94,491,942.

CHARTS.

27. Estimated production of cereals in 1875.

[The third column includes oats, barley, rye, and buckwheat, oats constituting by far the greater proportion.]

States.	Corn.	Wheat.	All cereals.
	Bushels.	*Bushels.*	*Bushels.*
Maine	1, 300, 000	282, 000	5, 095, 000
New Hampshire	1, 650, 000	198, 000	3, 265, 000
Vermont	1, 720, 000	430, 000	7, 284, 000
Massachusetts	1, 620, 000	36, 500	2, 886, 500
Rhode Island	290, 000	....	476, 000
Connecticut	1, 775, 000	39, 500	3, 408, 100
New York	19, 750, 000	5, 200, 000	75, 450, 000
New Jersey	9, 600, 000	1, 900, 000	16, 185, 000
Pennsylvania	44, 000, 000	15, 200, 000	97, 640, 000
Delaware	3, 267, 000	745, 000	4, 453, 100
Maryland	14, 200, 000	5, 100, 000	22, 732, 500
Virginia	21, 333, 000	6, 700, 000	34, 128, 600
North Carolina	22, 275, 000	3, 050, 000	28, 915, 000
South Carolina	9, 240, 000	750, 000	10, 888, 000
Georgia	20, 100, 000	3, 050, 000	27, 455, 000
Florida	2, 150, 000	....	2, 273, 000
Alabama	24, 500, 000	1, 190, 000	26, 552, 000
Mississippi	23, 220, 000	420, 000	24, 455, 500
Louisiana	7, 920, 000	....	7, 951, 500
Texas	31, 000, 000	2, 510, 000	35, 242, 000
Arkansas	19, 448, 000	1, 955, 000	22, 405, 000
Tennessee	58, 000, 000	13, 130, 000	76, 397, 000
West Virginia	10, 560, 000	2, 000, 000	15, 053, 000
Kentucky	60, 200, 000	7, 960, 000	75, 700, 000
Ohio	95, 000, 000	17, 500, 000	137, 640, 000
Michigan	23, 600, 000	16, 870, 000	53, 855, 000
Indiana	95, 000, 000	17, 280, 000	131, 220, 000
Illinois	280, 000, 000	27, 300, 000	387, 980, 000
Wisconsin	15, 200, 000	25, 200, 000	70, 815, 000
Minnesota	7, 340, 000	27, 200, 000	48, 859, 000
Iowa	160, 000, 000	29, 800, 000	224, 910, 000
Missouri	128, 000, 000	11, 160, 000	160, 770, 000
Kansas	76, 700, 000	12, 700, 000	101, 350, 000
Nebraska	28, 000, 000	3, 400, 000	36, 285, 000
California	1, 500, 000	23, 800, 000	36, 560, 000
Oregon	96, 000	4, 500, 000	7, 500, 500
Nevada	15, 000	380, 000	980, 000
The Territories	1, 500, 000	3, 200, 000	7, 220, 000
Total	1, 321, 069, 000	292, 136, 000	2, 032, 265, 300

28. Number of farm animals, (from estimates of 1875.)

States.	Horses.	Mules.	Milch-cows.	Oxen and other cattle.	Sheep.	Hogs.
Maine	79, 400	....	164, 300	201, 900	525, 900	58, 800
New Hampshire	47, 000	....	98, 200	118, 000	242, 400	37, 300
Vermont	74, 500	....	209, 500	130, 500	490, 500	51, 800
Massachusetts	104, 700	....	140, 300	120, 000	76, 300	75, 600
Rhode Island	14, 700	....	20, 400	16, 000	25, 300	16, 300
Connecticut	51, 100	....	110, 900	114, 100	92, 500	57, 900
New York	679, 100	18, 500	1, 496, 300	663, 200	1, 936, 500	568, 700
New Jersey	115, 700	15, 000	144, 900	83, 000	125, 800	153, 000
Pennsylvania	585, 100	26, 300	837, 000	708, 100	1, 640, 500	875, 000
Delaware	19, 600	4, 000	23, 000	31, 700	23, 600	46, 700
Maryland	105, 500	11, 000	100, 700	119, 300	141, 200	233, 500
Virginia	194, 900	29, 800	227, 000	397, 500	356, 400	589, 800
North Carolina	139, 700	51, 700	201, 000	313, 200	283, 900	758, 300
South Carolina	56, 900	44, 700	159, 300	186, 700	142, 700	275, 900
Georgia	118, 300	96, 200	265, 100	400, 900	371, 200	1, 360, 700
Florida	16, 700	9, 600	66, 800	363, 400	37, 800	175, 400
Alabama	104, 400	101, 400	168, 200	327, 300	185, 900	755, 900
Mississippi	89, 100	96, 100	174, 600	307, 100	151, 800	792, 900
Louisiana	76, 300	79, 900	89, 600	171, 900	68, 800	222, 600
Texas	770, 400	110, 700	500, 100	2, 343, 700	1, 691, 400	1, 090, 000
Arkansas	158, 900	83, 400	160, 900	261, 300	192, 400	901, 200
Tennessee	318, 000	101, 900	225, 700	323, 700	341, 700	1, 026, 400
West Virginia	111, 900	2, 400	125, 500	235, 200	544, 500	248, 400
Kentucky	364, 700	85, 000	244, 700	389, 600	683, 600	1, 604, 300
Ohio	760, 800	26, 500	809, 600	864, 900	4, 546, 600	1, 596, 100
Michigan	296, 900	3, 800	361, 100	410, 000	3, 450, 600	459, 700
Indiana	675, 600	58, 400	434, 900	772, 300	1, 250, 000	2, 136, 000
Illinois	1, 091, 700	111, 100	717, 800	1, 287, 000	1, 311, 000	2, 640, 100
Wisconsin	352, 100	5, 200	474, 000	448, 900	1, 162, 800	540, 700
Minnesota	172, 400	3, 200	233, 500	329, 500	190, 200	213, 400
Iowa	685, 800	37, 000	621, 800	913, 200	1, 663, 900	3, 296, 200
Missouri	581, 500	126, 200	438, 200	813, 800	1, 284, 200	1, 874, 300
Kansas	227, 300	20, 700	235, 700	486, 200	123, 900	246, 500
Nebraska	67, 900	4, 600	59, 700	86, 900	48, 900	80, 900
California	209, 300	19, 400	363, 800	1, 075, 000	6, 750, 000	363, 300
Oregon	91, 400	3, 700	80, 900	137, 600	710, 500	181, 500
Nevada	10, 900	1, 100	9, 900	46, 700	20, 900	5, 200
The Territories	115, 100	26, 000	290, 500	786, 000	3, 049, 200	116, 500
Total	9, 735, 300	1, 414, 500	11, 085, 400	16, 785, 300	35, 935, 300	25, 726, 800

29. Value of horses and cows in several States; average of the past five years.

1. Horses.

$130 to $100.	New Jersey. Massachusetts. Rhode Island. Connecticut. Florida.
$100 to $90.	Pennsylvania. Georgia. South Carolina. New York. Vermont. Mississippi.
$90 to $80.	Maryland. Louisiana. Maine. New Hampshire. North Carolina. Delaware. Alabama.
$80 to $70.	Michigan. Virginia. Ohio. Tennessee. Wisconsin. Minnesota. Arkansas. Nebraska.
$70 to $65.	West Virginia. Indiana. Kentucky. Iowa. Illinois.
$65 to $50.	Kansas. Missouri. The Territories.
$50 to $30.	Nevada. Oregon. California. Texas.

2. Cows.

$50 to $40.	New Jersey. Massachusetts. Connecticut. Rhode Island.
$40 to $35.	Nevada. California. Vermont. New York. Pennsylvania. New Hampshire. Maine.
$35 to $30.	Michigan. Ohio. Delaware. The Territories. Maryland. Nebraska. Illinois. Indiana. Kentucky. West Virginia.
$30 to $25.	Oregon. Wisconsin. Iowa. Minnesota. Kansas. Virginia.
$20 to $25.	Missouri. Louisiana. South Carolina. Mississippi. Tennessee. Georgia. Alabama.
$20 to $10.	Arkansas. North Carolina. Florida. Texas.

30. Industrial education.

State.	Teachers.	Students.	Acres donated.	Acres sold.	Acres in farm.	Value of farm.	Value of buildings.	Value of all property.
Alabama	8	88	240,000	240,000	200	$2,000	$100,000	$327,500
Arkansas	8	9	150,000	150,000	160	12,000	5,000	300,000
California	27	85	150,000	150,000	200	......	......	1,087,500
Connecticut	29	224	180,000	180,000	......	......	225,000	614,000
Delaware	8	42	90,000	90,000	70	15,000	50,000	139,000
Florida	......	......	90,000	90,000	......	......	......	100,134
Georgia	15	344	270,000	270,000	70	2,500	200,000	346,000
Illinois	24	131	480,000	454,560	623	60,000	200,000	866,308
Indiana	7	......	390,000	390,000	184	60,000	25,000	510,000
Iowa	17	277	240,000	63,025	870	10,584	237,000	968,899
Kansas	15	237	90,000	57,495	415	3,000	31,000	458,782
Kentucky	8	95	330,000	330,000	433	130,000	120,000	311,000
Louisiana	6	225	210,000	210,000	370	......	65,000	258,620
Maine	8	115	210,000	210,000	......	......	......	......
Maryland	5	52	210,000	210,000	270	13,500	60,000	210,000
Massachusetts	48	391	360,000	360,000	383	37,500	163,500	1,460,627
Michigan	14	156	240,000	75,584	676	10,148	109,500	929,699
Minnesota	10	9	120,000	64,997	143	8,500	1,200	357,250
Mississippi	11	5	210,000	210,000	310	5,100	100,000	229,515
Missouri	19	142	330,000	1,571	600	60,000	75,000	......
Nebraska	4	20	90,000	......	480	......	......	468,000
Nevada	14	29	90,000	......	......	......	......	......
New Hampshire	11	57	150,000	150,000	163	15,000	50,000	240,000
New Jersey	30	73	210,000	210,000	99	30,000	75,000	292,200
New York	5	7	990,000	580,800	200	40,000	560,000	2,651,998
North Carolina	11	100	270,000	270,000	......	......	......	......
Ohio	6	60	630,000	630,000	320	112,000	......	904,000
Oregon	12	148	90,000	700	36	5,000	6,000	239,000
Pennsylvania	13	40	780,000	780,000	600	59,136	300,000	897,589
Rhode Island	2	20	120,000	120,000	......	......	......	56,000
South Carolina	16	53	180,000	180,000	116	9,000	35,000	200,800
Tennessee	......	......	300,000	300,000	260	30,000	53,000	397,190
Texas	7	14	180,000	180,000	800	......	......	291,240
Vermont	26	423	150,000	150,000	......	......	......	416,972
Virginia	5	15	300,000	300,000	369	39,740	89,000	491,448
West Virginia	14	17	150,000	150,000	25	......	80,000	155,000
Wisconsin	......	......	240,000	187,597	234	......	164,000	359,204
Total	463	3,703	9,510,000	7,996,329	......	......	......	17,535,475

ILLUSTRATIONS OF AGRICULTURAL COLLEGES.

In further illustration of the statistics of industrial education, a series of engravings is presented, wood upon lithographic tint, of the principal college buildings, in connection with special statistics of the institution represented.

31. College of Agriculture and the Mechanic Arts, Hanover, N. H.
32. Institute of Technology, Boston, Mass.
33. Agricultural College, Amherst, Mass.
34. College of Agriculture, (Cornell University,) Ithaca, N. Y.
35. Agricultural and Mechanical College, Columbus, Ohio.
36. Industrial University, Urbana, Ill.
37. "Ashland," homestead of Henry Clay, regents' residence, Kentucky University, Lexington, Ky.
38. College of Agriculture, Berkeley, Cal.
39. Female College, University of Wisconsin, Madison, Wis.
40. College of Agriculture, Lincoln, Nebr.
41. Industrial University, Fayetteville, Ark.
42. College of Agriculture, Dahlonega, Ga.
43. Agricultural and Normal Institute, Hampton, Va.

Accompanying the exhibit of charts of statistics of farm animals are black and tint lithographs of animals deemed worthy to represent the principal breeds as types, with grades of some of the principal breeds, to show the effect of the cross upon common stock.

The second is the famous cow that brought, at auction, $40,600; the last, the cow that gave 100 pounds of milk, daily, for thirty days.

44. Shorthorn bull, (Bates,) Duke of Airdrie, (12,730.)
45. Shorthorn cow, (Bates,) Duchess of Geneva.
46. Shorthorn bull, (Booth,) Breastplate, (11,431.)
47. Shorthorn grade steer.
48. Devon bull, Huron.
49. Jersey bull, King of Prairie.
50. Dutch cow, Infrau.
51. Ayrshire grade, "Old Creamer."
52. Centennial Album of Agricultural Statistics, collecting in compact form all the above exhibits, except the large maps and charts.

THE TOBACCO CROP.

A county thirty miles square probably contains an area equal to the present tobacco-field of the United States. While tobacco is grown in every State, only about one county in ten produces enough to make any account of in the commerce of tobacco-growing. There are a few more than two hundred counties that exceed the low limit of 100,000 pounds.

Kentucky is now the first State in production, followed by Virginia, Missouri, Tennessee, Maryland, North Carolina, and Ohio. In these States the production is very unequal in the different localities.

The crop of 1874 was exceedingly poor; it was accorded a "failure," scarcely half a crop being obtained. The year 1875 witnessed a comparative recovery, though the aggregate was not large. The estimate of this division, as reported elsewhere, is 379,347,000 pounds, grown on 559,049 acres, (875 square miles,) and valued in home markets at $30,342,600. The increase in product over 1874 is quite general, and in many cases very large. In Virginia, Pittsylvania County returns 6,000,000 pounds against 4,200,000 last year, and Mecklenburgh 4,000,000 instead of 2,000,000. Several of the best tobacco counties in North Carolina report a large increase. Tennessee came nearer a total failure in 1874 than any other State, making the figures for 1875 appear very conspicuous. In Kentucky and Missouri there is also a large increase.

The Connecticut River crop in New Hampshire matured well, under the influence of a warm autumn, but suffered locally from frosts. The Hampden County (Massachusetts) yield might be considered average in quality, with perhaps a smaller percentage than usual of prime wrapper-leaf, the result of the ravages of the cut-worm at the time of setting. Hartford, the center of the Connecticut supply, made only a medium quality, resulting from unfavorable weather for growing and curing. The crop of the Litchfield region is of low quality, from late setting and subsequent drought. The New York crop is light.

In York, Pennsylvania, the leaf is large in size and of fine texture, though much of it is subject to a blemish caused by intervals of hot sunshine in cloudy weather, causing the leaf to "fox." The crop is larger and finer than that of 1874. Except the "foxy" portion, it is equal to the stock of 1873, the finest ever produced in that region. Some of it was injured by being stripped in too damp a condition, making it too tender for wrappers. The price varies from 4 to 20 cents, the average being placed at 8 cents. The estimate for Lancaster County, 13,884,000 pounds, grown on 9,286 acres, shows that the interest is not declining in the heart of Pennsylvania. The crop is worth about $2,500,000.

The quality of the tobacco of Calvert, Maryland, is decidedly better than that of the previous crop. Seasonable rains caused luxuriant growth and a fine texture of leaf. Good weather throughout the curing process produced a larger proportion of yellow and red quali-

ties. The same causes, however, gave an unusual proportion of "ground-leaf," so that fully one-sixth of the crop went to market in this form, and sold at very low prices. In Charles the quality is generally good, the leaf fine and silky, generally bright, but very light from excess of rain in August, being forced up too rapidly to acquire body and weight. In Howard the season for planting and growth was propitious; in the later season growth was too rapid, producing a weaker leaf than usual. The Montgomery yield was of average quality.

The quality in Prince George's County is above average, the principal defect being the "firing" of the ground-leaves from excessive rains. In some cases the ground-leaves were a third of the crop, selling in the fall at 3 to 9 cents per pound. In Saint Mary's a good quality was obtained, a little light in proportion to bulk. The Frederick crop was an average in quality.

A large increase of area was made in Albemarle, Virginia, in consequence of the small crop and high prices of 1874, which was reduced somewhat by frost in April. The season was subsequently favorable to leaf-growth, and a large crop was obtained of light and thin tobacco, deficient in the essentials of a "good, heavy, rich article." A large proportion of the crop of Botetourt is characterized as nondescript, due to several causes: 1st, early summer drought; 2d, the ripening and housing season too wet; 3d, the colored people entered more largely into tobacco growing last year than ever before in this county, many of them not having suitable land, others without proper facilities to cultivate a crop, and others too indolent to give it that prompt and careful attention which is necessary to secure a good article. Our Brunswick correspondent is enthusiastic over the tobacco-lands of his vicinity, claiming the best shipping-tobacco in the United States—light-clay surface on red-clay subsoil. In Buckingham a wet summer reduced the average quality. In Campbell injury was caused by early frost. In Caroline a fair quality was obtained, yet a large portion of the crop went to market in too damp a condition. The prevalent cause of injury, too much rain in the growing-season, rendered the Charlotte crop rather light. A medium grade was reached in Chesterfield; the best on good lands, well manured and thoroughly cultivated; the poorest injured by wet weather and green cutting. Early frosts in Floyd did not reduce the average of quality below medium. The heavier soils of Fluvanna, the river-bottoms, and heavy clays yielded a coarse article; the light soils produced a better grade. A large increase of product was realized. The quality of the product of Franklin was reduced in consequence of the planting and poor cultivation, in many instances. It was of light and chaffy quality in Goochland, from excess of wet weather, and light, also, in Hanover. An unusually favorable season for ripening and curing made an excellent crop in Henry. In Lunenburgh the weather was unfavorable in August and also in December and January, and there was a lack of suitable barns and curing-houses for protection from the weather. There is a popular opinion here that the use of commercial fertilizers reduces the quality. The great number of small patches without facilities for curing causes a reduction of the average. An excellent quality was obtained in Mecklenburgh, especially on high lands, the lower situations being somewhat too wet in August. The weather was too wet in Montgomery and too dry in Nottoway. In Prince Edward the wet weather, at the usual period for cutting, continued, and made it necessary to cut much of it before full maturity. The quality of Danville tobacco is not quite up to the standard of last year, but is medium and the color good. In Powhatan the leaf was light from the excess of summer rains. Planters

here generally concede that the crop of 1875 is from five to ten times as great as in 1874, and that but for excessive rains it would have been a third larger still.

The effect of excessive moisture is seen very generally in the crop of North Carolina, which has more light and chaffy material in it than usual. This is specially noticed in Person, Alamance, Caswell, Granville, Orange, Stokes, Forsyth, and Surry. It is about an average in Guilford. Still there is some rich, waxy stock of good color; a fair proportion of a comparatively bright article, but little that is strictly fine, yellow tobacco. In some cases tobacco wanting in wax has a desirable color. In Caswell there was considerable injury from the "spot" and "sore-shin," (rotting of the stock near the surface of the ground,) and less than half a crop was produced. Our correspondent in Alamance County regards the use of flues of brick or stone, covered with sheet-iron and making a circuit through the shed or barn, as less dangerous than the method of curing by coal. Wood is supplied from the outside, and the heat can easily be regulated. Sun-curing is deemed best for chewing-tobacco.

The crop of Cuban tobacco grown in Gadsden County, Florida, is increasing in quantity. In 1870 the census reported 118,729 pounds. Last spring our reporter returned 200,000, and this spring 350,000 pounds for the crop of 1875, grown on 450 acres, an enlargement of 50 per cent. in the area planted. The quality is the best of any crop since 1865, attributed to the fact that experienced planters have resumed its cultivation. It is claimed that the test of forty years' experience proves that deterioration is not produced in that soil and that climate, and the opinion is expressed that Florida tobacco should supersede the Cuban in cigars.

The effect of wet weather is also seen in Tennessee in reducing the quality of this product; and a further reason adduced is the inexperience of a multitude of beginners in the business. There is evident increase of care in handling. The necessity is felt of stamping or rolling and "brushing" heavily the seed-bed after seeding, to secure the retention of moisture during the period of March and April winds.

Injury to quality has been very general in Kentucky, the plants being submerged in June and July, and subsequently exposed to great heat, parching and cracking the earth, and "firing" the leaf, and resulting in an immature crop, deficient in gum and chaffy in texture. In some sections there was too much rain in August. There is not so much loss in the color as in other qualities. There is much tobacco that is "frenched." Bad quality is attributed to bad handling, in Fulton County. The leaf is short and the color dark in Pendleton. Medium or good quality is reported in Oldham, Metcalfe, and Livingston. Cutting and manufacturing is reported bright in Muhlenburgh County.

Wet weather had its influence in Ohio, and early frost caught a portion of it in immature condition. Along the Ohio River considerable areas were entirely destroyed by floods, and in the interior many fields were similarly destroyed. The color, as well as the texture of the leaf, suffered injury quite generally. The Warren County crop is represented as a total failure. In Noble, new land products are fine. A leaf of fair quality, though light, is reported in Morgan. In Adams County that grown on rolling land is fine, but the product of level lands is light and trashy. In Vinton there was much rain in the early part of the season; the later months were very favorable, the plant ripened well, the leaf was thick and retained its gum, and the crop is claimed to be the best ever raised there.

The crop of Indiana suffered from causes affecting tobacco elsewhere. "Frenching" was very common, and the cutting was necessarily done in many instances before maturity, greatly deteriorating the quality.

Quality is also lower in Illinois. In some localities increased attention has been paid to this crop, and the area greatly enlarged—in part, by new-comers from the Southern States.

A marked increase in the area planted in Missouri is indicated, as the tables will show. There is much complaint of injury by wet weather and subsequent heat, and frequent mention of "frenching," but less than in the States of the Ohio River. Inexperience in housing and curing has effected quality in Saint Charles, and the army-worm wrought some injury. Late planting, after the disappearance of grasshoppers, left the crop immature at the season for cutting in Ray County. In Franklin the injury was only from drought and frost. In Chariton, quality is generally good; also, in Randolph a favorable season was enjoyed; and the product of Howard was very good. In Howard County the season was favorable for planting; a large portion of the crop was set early; it was remarkable throughout the growing period; no annoyance by worms, no "ragged edges;" but little was frosted. The autumn was dry, and very favorable for taking care of the crop. These conditions caused quantity, quality, and color to be remarkably good. The season was so favorable that some portions of the crop were cured outdoors for want of house-room.

The following census of the principal tobacco-yielding counties, for 1875, will show where the crop is mainly produced. About one-fourth of the tobacco district is reported:

States and counties.	Pounds, census of 1870.	Pounds, estimated for 1875.	Number of acres in 1875.	Price per pound, 1875.	Value, 1875.
PENNSYLVANIA.				*Cents.*	
York	527, 808	1, 275, 000	850	9	$114, 750
Lancaster	2, 692, 584	13, 884, 000	9, 256	5. 5	763, 620
Total	3, 220, 392	15, 159, 000	10, 106	5. 7	878, 370
MARYLAND.					
Calvert	3, 158, 200	3, 350, 000	5, 550	7. 5	251, 250
Charles	2, 102, 739	2, 100, 000	3, 000	7. 5	157, 500
Howard	182, 980	150, 000	250	10	15, 000
Montgomery	630, 000	800, 000	1, 000	12	96, 000
Prince George's	3, 665, 054	4, 800, 000	7, 500	9	432, 000
Saint Mary's	2, 522, 917	3, 000, 000	4, 000	8	240, 000
Frederick	274, 369	332, 000	....	.....	....
Total	12, 536, 259	14, 532, 000	21, 300	8. 3	1, 191, 750
VIRGINIA.					
Albemarle	1, 781, 619	3, 000, 000	4, 500	7	210, 000
Bedford	1, 956, 157	3, 800, 000	5, 066	8	304, 000
Botetourt	196, 459	650, 000	1, 200	6	39, 000
Brunswick	1, 121, 480	2, 522, 190	2, 500	8	201, 775
Buckingham	809, 937	1, 255, 580	2, 550	7	87, 890
Campbell	1, 761, 901	1, 813, 800	2, 250	7	126, 966
Caroline	417, 848	400, 000	500	6	24, 000
Charlotte	1, 964, 736	1, 600, 000	....	8	128, 000
Chesterfield	194, 510	200, 000	500	9	18, 000
Dinwiddie	844, 504	495, 000	1, 320	8	39, 600
Floyd	157, 467	360, 000	900	12	43, 200
Fluvanna	894, 023	1, 200, 000	1, 200	10	120, 000
Franklin	1, 696, 549	1, 900, 000	4, 000	9	171, 000
Hanover	439, 434	329, 574	450	6	19, 774
Henry	1, 129, 617	30, 000, 000	5, 000	11	330, 000
Lunenburgh	963, 673	775, 000	2, 000	6. 5	50, 375

States and counties.	Pounds, census of 1870.	Pounds, estimated for 1875.	Number of acres in 1875.	Price per pound, 1875.	Value, 1875.
VIRGINIA—Continued.				*Cents.*	
Mecklenburgh	2, 166, 628	4, 000, 000	7, 000	6	$240, 000
Montgomery	204, 747	800, 000	1, 250	18	144, 000
Nottoway	653, 296	914, 614	1, 400	6	54, 876
Patrick	323, 886	1, 001, 658	1, 178	10	100, 165
Powhatan	541, 430	790, 000	700	11	86, 900
Pittsylvania	4, 282, 511	6, 000, 000	14, 000	10. 5	630, 000
Prince Edward	960, 700	1, 200, 000	2, 400	7. 5	90, 000
Goochland	405, 215	726, 000	726	6	43, 560
Total	25, 868, 327	38, 733, 416	62, 590	8. 5	3, 303, 081
NORTH CAROLINA.					
Alamance	155, 570	640, 000	1, 600	12	76, 800
Caswell	2, 262, 053	1, 750, 000	3, 500	10	175, 000
Forsyth	238, 262	1, 000, 000	2, 000	10	100, 000
Granville	2, 134, 228	2, 200, 000	4, 400	10	220, 000
Orange	530, 442	1, 005, 000	2, 010	9	90, 450
Person	1, 227, 150	1, 500, 000	3, 080	10	150, 000
Stokes	844, 145	900, 000	1, 600	8	72, 000
Guilford	177, 782	143, 412	370	8	11, 472
Surry	254, 286	747, 000	2, 450	8. 5	63, 495
Total	7, 823, 918	9, 885, 412	21, 010	9. 7	959, 217
FLORIDA.					
Gadsden	118, 799	350, 000	450	......	....
KENTUCKY.					
Adair	1, 231, 665	1, 500, 000	3, 000	4	60, 000
Allen	747, 489	750, 000	1, 000	6	45, 000
Ballard	2, 863, 455	2, 343, 600	3, 255	8¼	193, 473
Boone	279, 740	560, 000	600	6	33, 600
Bracken	4, 188, 039	4, 000, 000	6, 666	7	280, 000
Breckinridge	3, 338, 471	3, 250, 000	6, 500	7. 5	243, 750
Callaway	1, 924, 502	2, 000, 000	2, 500	7	140, 000
Carroll	669, 875	700, 000	850	8	56, 000
Clinton	117, 238	225, 000	425	6	13, 500
Cumberland	1, 304, 366	900, 000	1, 650	7	63, 000
Daviess	6, 273, 067	8, 500, 000	....	7	595, 000
Edmonson	414, 840	150, 000	300	7	10, 500
Fulton	383, 636	500, 000	666	8½	42, 500
Gallatin	157, 050	225, 000	375	7¼	16, 312
Grayson	859, 760	1, 300, 000	3, 222	5	65, 000
Green	1, 375, 091	2, 000, 000	2, 750	6. 5	130, 000
Harrison	281, 704	275, 000	550	9	24, 750
Hart	2, 315, 212	1, 120, 000	1, 600	7	78, 400
Henry	1, 375, 364	800, 000	900	7	56, 000
Hopkins	3, 012, 053	5, 000, 000	8, 333	6	300, 000
Kenton	360, 983	500, 000	750	7	35, 000
Livingston	1, 086, 578	500, 000	250	5	25, 000
Logan	2, 707, 571	4, 656, 000	11, 640	6¾	314, 280
Marion	132, 293	40, 000	100	6	2, 400
Marshall	1, 416, 282	1, 500, 000	3, 000	6	90, 000
McLean	2, 262, 037	1, 750, 000	8, 750	6½	113, 750
Monroe	674, 096	600, 000	1, 000	5	30, 000
Muhlenburgh	1, 821, 988	4, 000, 000	6, 000	7	280, 000
Owen	2, 890, 670	3, 650, 000	7, 300	6	219, 000
Pendleton	1, 651, 593	1, 600, 000	2, 500	8	128, 000
Shelby	240, 435	145, 000	180	7	10, 150
Simpson	1, 072, 401	2, 000, 000	3, 600	6	120, 000
Taylor	1, 209, 830	1, 202, 000	3, 000	4. 5	54, 090
Union	2, 096, 260	4, 000, 000	8, 000	7¼	290, 000
Fleming	305, 954	600, 000	750	7. 5	45, 000
Metcalfe	1, 310, 381	800, 000	500	5	40, 000
Oldham	301, 285	400, 000	500	5	20, 000
Meade	539, 000	650, 000	100	6	39, 000
Total	55, 192, 854	64, 691, 600	103, 062	6. 6	4, 302, 329
TENNESSEE.					
Benton	412, 435	800, 000	1, 800	6	48, 000
Cheatham	419, 265	600, 000	1, 000	8	48, 000
Dickson	462, 130	750, 000	1, 500	7. 5	56, 250
Jackson	713, 578	1, 500, 000	3, 000	5. 5	82, 500
Macon	950, 768	600, 000	750	6	36, 000

States and counties.	Pounds, census of 1870.	Pounds, estimated for 1875.	Number of acres in 1875.	Price per pound, 1875.	Value, 1875.
TENNESSEE—Continued.				*Cents.*	
Montgomery	4, 856, 378	6, 500, 000	....	8. 9	$578, 500
Robertson	2, 103, 322	2, 700, 000	5, 400	8	216, 000
Smith	2, 250, 202	3, 636, 000	4, 545	5	181, 800
Sumner	909, 568	337, 500	750	5. 5	18, 562
Putnam	131, 856	165, 500	206	7	11, 585
Wilson	332, 901	600, 000	....	5. 5	33, 000
Weakley	2, 599, 590	3, 603, 600	5, 148	7. 5	270, 270
Total	16, 141, 993	21, 792, 600	24, 099	7. 2	1, 580, 467
WEST VIRGINIA.					
Cabell	135, 410	100, 000	150	5	5, 000
Kanawha	412, 469	306, 250	245	12	36, 750
Mercer	117, 429	140, 000	185	12	16, 800
Monroe	123, 221	160, 000	475	10	16, 000
Total	788, 529	706, 250	1, 055	10. 5	74, 550
OHIO.					
Adams	102, 473	150, 000	240	12	18, 000
Belmont	1, 480, 478	639, 518	744	5. 5	35, 173
Brown	2, 687, 743	550, 000	656	9	49, 500
Greene	277, 360	200, 000	250	4. 5	9, 000
Guernsey	474, 178	450, 000	800	5. 5	24, 750
Monroe	2, 845, 525	2, 400, 000	4, 000	5. 5	132, 000
Montgomery	3, 963, 183	1, 050, 000	3, 200	5	52, 500
Morgan	486, 125	900, 000	1, 200	5¼	47, 250
Noble	2, 304, 557	1, 500, 000	1, 500	5. 5	82, 500
Preble	330, 987	290, 000	400	4¼	12, 325
Vinton	110, 739	144, 000	144	5	7, 200
Warren, (total failure)	....	....	....	......	....
Total	15, 063, 348	8, 273, 518	13, 134	5. 6	470, 198
INDIANA.					
Pike	1, 119, 356	1, 000, 000	1, 500	4. 5	45, 000
Spencer	3, 019, 970	3, 500, 000	10, 000	6	210, 000
Warrick	3, 611, 775	4, 000, 000	8, 000	5	200, 000
Total	7, 751, 101	8, 500, 000	19, 500	5. 3	455, 000
ILLINOIS.					
Hamilton	471, 860	600, 000	1, 000	5. 5	33, 000
Johnson	307, 013	196, 000	280	5	9, 800
Pulaski	157, 000	60, 000	120	8	4, 800
Saline	1, 155, 941	2, 000, 000	4, 000	5½	110, 000
White	135, 045	150, 000	450	5	7, 500
Williamson	1, 152, 589	2, 400, 000	4, 800	5¾	138, 000
Edwards	133, 150	120, 000	160	......	....
Total	3, 512, 598	5, 526, 000	10, 810	5. 6	303, 100
WISCONSIN.					
Dane	229, 568	(*)	1, 929	4	....
Rock	645, 508	2, 210, 000	2, 210	6	132, 600
Total	875, 076	2, 210, 000	4, 139	6	132, 600
MISSOURI.					
Boone	149, 634	1, 500, 000	2, 145	5. 5	82, 500
Chariton	2, 993, 981	12, 000, 000	10, 000	5. 5	660, 000
Franklin	783, 270	463, 000	590	9	41, 670
Howard	788, 182	1, 500, 000	2, 500	5	75, 000
Lincoln	891, 727	700, 000	1, 200	10	70, 000
Montgomery	203, 170	187, 500	208	10¼	19, 218
Osage	119, 617	250, 000	275	10	25, 000
Randolph	873, 776	4, 500, 000	5, 600	5¼	236, 250
Ray	190, 355	80, 000	133	3½	2, 800
Saint Charles	146, 754	96, 000	160	8	7, 680
Saline	215. 475	2. 500. 000	2, 500	5½	137, 500
Stoddard	118, 534	210, 000	250	5	10, 500
Webster	143, 162	500, 000	625	10	50, 000
Total	7, 617, 587	24, 486, 500	26, 186	5. 7	1, 418, 118

*Almost a failure.

FLOUR AND GRAIN MOVEMENTS.

EXPORT TRADE.

During the fiscal year ending June 30, 1875, our foreign exports of cereals and their immediate manufactures declined about 25 per cent. in quantity and 30 per cent. in aggregate value from the enormous figures of 1874. Compared with 1873, however, the aggregates of 1875 show an advance of 11 per cent. in quantity and 13 per cent. in declared value. The great increase in the exports of 1874 was caused by failures of European wheat-crops for two or three previous years. But the crop of 1874, in the British Islands and on the Continent, was of unusual abundance, greatly narrowing the demand for American wheat. This was shown by a decline in our exports almost from the beginning of the fiscal year of 1875. Our barley export declined over 70 per cent. in both quantity and value; corn and corn-meal, 17 per cent. in quantity and 13 per cent. in value; wheat and wheat-flour, 20 per cent. in quantity and 36 per cent. in value; oats, 38 per cent. in quantity and 24 per cent. in value; rye and rye-flour, about 87 per cent. in both quantity and value. Every one of our cereals, except those inconsiderable articles classed as "other small grain and pulse" in the official reports, shows a greater or less decline. Rice, which is generally classed among breadstuffs, showed an export of 276,844 pounds, worth $19,806, in 1875, against 558,922 pounds, worth $27,075, in 1874, a reduction of 50 per cent. in quantity and over 26 per cent. in value. Bread and biscuit show a slight increase in quantity and about an equal decrease in value. Other preparations of breadstuffs for food show a small increase in value.

The following table, compiled from official reports of the Treasury, shows the comparative export of our leading cereals, with their immediate manufactures, during the twelve fiscal years ending June 30, 1875:

Years.	Quantities.					
	Flour.	Wheat.	Wheat and flour reduced.	Corn.	Corn-meal.	Corn and meal reduced.
	Barrels.	*Bushels.*	*Bushels.*	*Bushels.*	*Barrels.*	*Bushels.*
1864	3, 557, 347	23, 681, 712	41, 468, 447	4, 096, 684	262, 357	5, 156, 112
1865	2, 604, 542	9, 937, 152	22, 959, 862	2, 812, 726	199, 419	3, 610, 402
1866	2, 183, 050	5, 579, 103	16, 494, 353	13, 516, 651	237, 235	14, 465, 591
1867	1, 300, 106	6, 146, 411	12, 646, 941	14, 889, 823	284, 281	16, 026, 947
1868	2, 076, 423	15, 940, 899	26, 323, 014	11, 147, 490	336, 508	12, 493, 522
1869	2, 431, 873	17, 557, 836	29, 687, 201	7, 047, 197	309, 867	8, 286, 675
1870	3, 463, 333	36, 584, 115	53, 900, 780	1, 392, 115	187, 093	2, 140, 487
1871	3, 653, 841	34, 304, 906	52, 574, 111	9, 826, 309	211, 811	10, 673, 553
1872	2, 514, 535	26, 423, 080	38, 995, 755	39, 491, 650	308, 849	40, 727, 010
1873	2, 562, 086	39, 204, 285	52, 014, 715	38, 541, 930	403, 111	40, 154, 374
1874	4, 094, 094	71, 039, 938	91, 510, 408	34, 434, 606	387, 807	35, 985, 834
1875	3, 951, 086	53, 047, 175	72, 802, 605	28, 858, 420	291, 654	30, 025, 036

Years.	QUANTITIES.					
	Oats.	Barley.	Rye.	Rye-flour.	Rye and flour reduced.	Total cereals.
	Bushels.	*Bushels.*	*Bushels.*	*Barrels.*	*Bushels.*	*Bushels.*
1864	305, 755	66, 482	154, 960	6, 999	189, 955	47, 186, 751
1865	318, 117	44, 282	132, 459	3, 935	152, 134	27, 084, 797
1866	1, 245, 658	....	417, 127	13, 304	483, 647	32, 689, 247
1867	825, 895	....	147, 353	14, 603	220, 368	29, 720, 151
1868	122, 554	9, 810	501, 349	10, 592	554, 309	39, 503, 209
1869	481, 871	59, 077	49, 501	7, 228	85, 368	38, 600, 192
1870	121, 517	255, 490	157, 606	6, 974	192, 476	56, 610, 750
1871	147, 572	340, 093	49, 674	6, 250	80, 924	63, 816, 253
1872	262, 975	86, 891	794, 967	6, 287	826, 402	80, 899, 033
1873	714, 072	482, 410	562, 021	8, 288	603, 461	93, 969, 032
1874	812, 873	320, 399	1, 564, 484	59, 820	1, 863, 584	130, 493, 098
1875	504, 770	91, 078	207, 100	9, 993	257, 065	103, 680, 554

The preponderance of wheat in the above annual exports is especially remarkable. Including flour reduced to its equivalent, it constituted the major part of the export of every year except 1867 and 1872. In 1870, all other grains amounted to less than 5 per cent. of the aggregate export. In 1874, the wheat and flour exports amounted to ninety-one and a half million bushels, or nearly three-fourths of the aggregate for the year. The wheat export has steadily increased within the last half decade. The exports of corn have also risen to importance within the last few years. In 1872, corn and corn-meal constituted half the entire cereal export; being nearly 2,000,000 bushels greater than that of wheat. During the last five years, there has been an increasing demand for corn-meal for shipment abroad. Oats never entered largely into our foreign trade; its maximum export was about a million and a quarter of bushels in 1866, and its minimum but one-tenth of that amount in 1870. Barley and rye also show great fluctuations; the latter rose from half a million bushels in 1873 to a million and a half in 1874, but fell to a quarter million in 1875.

The exports of wheat and flour during the fiscal year 1864 amounted to nearly 24 per cent. of the estimated crop of the previous calendar year; in 1865, to 14.3 per cent.; in 1866, to 11.1 per cent.; in 1867, to 8.32 per cent.; in 1868, to 12.23 per cent.; in 1869, to 13.72 per cent.; in 1870, to 20.72 per cent.; in 1871, to 22.28 per cent.; in 1872, to 16.82 per cent.; in 1873, to 20.8 per cent.; in 1874, to 32.54 per cent.; in 1875, to 23.23 per cent. The proportion of flour to the whole wheat export had a wide range of variation. During 1864, the first year embraced in the above table, flour constituted 42.89 per cent. in quantity and 44.89 per cent. in value; it rose to the maximum, 66.18 per cent. in quantity and 70.11 per cent. in value, in 1866; in 1874, it had fallen to 22.37 per cent. in quantity and 22.39 per cent. in value, but rose in 1875 to 27.13 per cent. in quantity and 28.46 per cent. in value. With some fluctuations there has been a general decline in the proportion of flour to wheat and flour exports during the last nine years. The cause of this is stated to be in the increased demand for raw material by British millers as the basis of an enlarged home manufacture. The average export value of flour ranged from \$5.64 per barrel in 1864 to \$10.06 per barrel in 1869; the latter half of the twelve years indicating a permanent decline. The average value of raw wheat, with some fluctuations, fell from \$1.95 per bushel in 1865, its maximum, to \$1.12½ in 1875, its minimum. Flour

and wheat averaged together ranged from $2.03 per bushel in 1865 to $1.14 in 1875.

Of corn and corn-meal, the export during the fiscal year of 1864 amounted to 1.3 per cent. of the estimated crop of the previous calendar year; in 1865, to 0.7 per cent.; in 1866, to 2.5 per cent.; in 1867, to 2 per cent.; in 1868, to 1.7 per cent.; in 1869, to 0.9 per cent.; in 1870, to 0.3 per cent.; in 1871, to 1 per cent.; in 1872, to 3.6 per cent.; in 1873, to 3.7 per cent.; in 1874, to 3.9 per cent.; in 1875, to 3.5 per cent. The proportion of meal to the entire corn export has fluctuated; the maximum, 34.9 per cent. in quantity and 42.1 per cent. in value, was in 1870; the minimum, 3.3 per cent. in quantity and 4.8 per cent. in value, was in 1872; in 1875, it was but little above the minimum, being 3.8 per cent. in quantity and 5 per cent. in value. This declining proportion results less from a falling-off in barrels of meal than from an increase in bushels of grain during the last five years. The average export value of the raw grain ranged from $1.30.8 per bushel in 1865 to $0.61.7 in 1873; corn-meal varied from $7.47.1 per barrel in 1865 to $3.65.8 in 1873; corn and meal together were highest ($1.43 per bushel) in 1864 and lowest ($0.62.9 per bushel) in 1873. There was a partial reaction toward higher prices within the last ten fiscal years.

In 1865 only did the export of oats reach half of 1 per cent. of the previous crop. The greatest average value ($0.87.3 per bushel) was in 1863 and the smallest ($0.37.3) in 1874. The exports of barley range somewhat higher, somewhat exceeding 1 per cent. in 1870; but in most cases they fell below half of 1 per cent.

The exports of rye, including rye-flour, present small but fluctuating proportions of the previous crops, ranging from 0.4 per cent. in 1869 to 12.33 per cent. in 1874. The percentage of flour to the whole rye export was greatest in quantity (38 per cent.) in 1871 and greatest in value (49.67 per cent.) in 1869; the minimum (3.8 per cent. in quantity and 4.66 per cent. in value) was in 1872. The average export value of rye-flour was greatest ($8.58.6 per barrel) in 1868 and least ($5.12.2) in 1866; unmanufactured grain ranged from $1.66.9 per bushel in 1868 to $0.83 in 1873; the average export value of rye and rye-flour combined varied between $1.00.5 per bushel in 1872 and $1.29.2 in 1866.

The export of barley reached 1⅓ per cent. of the previous crop in the fiscal year of 1872, and was as low as 0.04 per cent. in 1867 and 1863; it has mostly been below half of 1 per cent. During the fiscal years 1866 and 1867, the export was too small for special mention. The average export value ranged from $1.30.3 per bushel in 1865 to $0.55 in 1870.

DOMESTIC TRADE.

During the calendar year 1875 our domestic trade in breadstuffs felt seriously the depression in the export trade. The receipts of flour and grain fell off 14,516,539 bushels at New York; 1,905,771, at Baltimore; 1,307,490, at Cincinnati; 14,544,712, at Chicago; and 3,403,684, at Saint Louis. This general decline is attributed partly to the diminished foreign demand, partly to our short wheat crop, and partly to the general depression in business that has subsisted ever since the monetary crisis of 1873. The depression in the eastward movement appears to have spent its force in the earlier part of the year. The annual report of the New York Produce Exchange states the decline of receipts of raw grain during the first nine months of 1875 at 19,118,513, compared with the same period of 1874; at the close of the year, the deficit had been reduced 6,387,136 bushels, showing an increased movement during the

last three months. Montreal during the nine months declined 646,373 bushels, and the five other leading sea-ports—Portland, Boston, Philadelphia, Baltimore, and New Orleans—increased 3,343,996 bushels, making the net decrease of the seven ports 16,421,503 bushels. During the same period, the receipts of the lake ports fell from 135,539,026 bushels to 107,078,154 bushels; a loss of 28,460,872, or nearly double the net decrease of the seven Atlantic ports.

These facts show a marked change in the lines of transit from the West to the Atlantic seaboard. The facilities for handling grain at the lake ports have been considerably improved, and the steam-tonnage increased. In 1874, the increasing competition between rail and water routes caused the legislature of New York to reduce one-third the tolls upon the canals of that State. Canal freights were unprecedentedly low in 1875, trenching severely upon the profits of the carrier; yet the eastward shipments during the season of 1875 from Buffalo declined 6,855,882 bushels, and those from Oswego 3,166,255 bushels, making an aggregate reduction compared with the season of 1874 of 10,022,137 bushels on the New York canals.

A lively competition between several through-lines of railway caused a low schedule of freights during the year. The rolling-stock was greater in 1875 than in 1874, and kept in more continuous use. During a portion of the year, rail transportation was upon an agreed schedule of rates, by which freight was charged $1 less per ton to Baltimore and Philadelphia than to New York, and to Boston $1 per ton more than to New York. Ocean freights at Baltimore and Philadelphia were not greatly different from those of New York, while those from Boston were somewhat less. After the opening of lake and canal navigation, freights by lake, canal, and river from Chicago to New York were from $3 to $3.17 per ton, not including transshipment charges at Buffalo. From Chicago to Montreal, including Welland and Saint Lawrence Canal tolls, the charges were $3 to $3.08 per ton. Flour and grain were carried in large quantities by rail, from Saint Louis to New York, at $4.80 per ton, or 3⅓ mills per ton per mile. These facts show the ground of those changes which have marked the transportation movement during the past year. Water transportation has lost ground in competition with rail-transport, and the southern or central lines have attracted the lion's share of the business which the lakes and canals have lost. The advantage of direct shipment, without transshipment, from the primary grain market of the West to the seaboard is becoming better appreciated every year. In the movement of corn, it is found that the grain is far less disposed to injury from heating when loaded in bulk upon freight-cars than when stored in large bins 60 feet deep, or in the damp holds of lake vessels. Oats is liable to the same injuries; hence shippers find it to their advantage to ship by rail, even if the cost of transportation be somewhat higher. The shorter southern lines bring the grain regions of the West nearer to tide-water, and transport at considerably lower rates than the lines terminating at New York and Boston. It is found also that the cost of winter rail transport is less along the southern lines than in the regions of frost and snow. These and other circumstances during the past year have caused the carrying-trade in cereals and other farm products to gravitate southward. But the work under contract for the enlargement of the Canadian canals will admit the passage of vessels of 150 per cent. greater tonnage, in which the grain of the Northwest may be shipped direct to European markets. This will, of course, cheapen transportation, as large vessels can carry freight more cheaply than small ones.

This branch of the water carrying-trade may then recover its prestige; but the New York canals, even with the entire abrogation of tolls, and the introduction of steam-power, cannot compete with rival routes unless they be enlarged to admit of a much larger class of vessels.

The supremacy of New York as a port of foreign shipment still continues; but other ports are gaining, while it is losing, both absolutely and relatively, in the marketing of cereal and other agricultural products. During the past year, the tendencies of the carrying-trade have been unfavorable to the practical monopoly which New York has till lately held. Some of those tendencies appear to be settled and permanent, especially that which throws an increasing proportion of heavy transportation into the hands of railway-men. But while New York is thus losing its hold upon the export trade of the country, its consumptive trade is rapidly increasing.

The following *résumé* of our leading markets will illustrate the flour and grain movements of the last four years:

NEW YORK.

The total receipts at New York of wheat, corn, oats, rye, and barley, including flour and meal, during 1875, amounted to 91,685,890 bushels, a loss, compared with 1874, of 14,416,749 bushels, or 13.6 per cent.; the exports amounted to 49,976,097 bushels, a loss of 23,900,411 bushels, or 32.4 per cent. About 57 per cent. of the receipts and 72 per cent. of the exports represented wheat and flour; corn and corn-meal amounted to 25 per cent. of the receipts, and 27 per cent of the exports. Wheat and flour receipts fell off nearly 13 per cent. and the exports nearly 22 per cent. Of corn and corn-meal, the receipts declined 27 per cent. and the exports 50 per cent. Oats fell off 156,841 in an aggregate of 10,792,919 bushels; the export is small, nearly the whole of the receipts being required for the consumption of the city and its environs. The receipts and exports of rye decreased, the former 49 per cent., and the latter 68 per cent. Barley alone, of the cereals, shows an increase in receipts, 4,710,598 bushels, against 2,770,000 in 1874; the export is too insignificant for mention. The stock of flour on hand at the close of the year amounted to 449,510 barrels, against 277,439 in 1874, 269,751 in 1873, and 363,624 in 1872. Of wheat, the stocks on hand at the close of each of the last five years respectively were as follows: 1875, 6,371,296 bushels; 1874, 4,600,711 bushels; 1873, 1,258,600 bushels; 1872, 2,132,740 bushels. Of corn, the remnants were, at the close of 1875, 691,690 bushels; 1874, 1,146,408 bushels; 1873, 1,272,500 bushels; 1872, 5,910,670 bushels. Of oats, 1875 left behind 1,321,587 bushels; 1874, 1,283,461 bushels; 1873, 417,600 bushels; 1872, 1,620,360 bushels. Of rye, the stock left over at the close of 1875 was 115,907 bushels; 1874, 114,899 bushels; 1873, 14,630 bushels; 1872, 96,240 bushels. Of barley, the stock on hand at the close of 1875 was 513,596 bushels; 1874, 561,051; 1873, 194,400 bushels; 1872, 1,286,487 bushels.

The movement of the grain trade at New York for the last four years is summarized in the following table:

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Exports.	Receipts.	Exports.	Receipts.	Exports.	Receipts.	Exports.
Flour ....bbl.	3,042,907	1,202,792	3,546,568	1,655,331	4,017,207	2,462,728	3,941,331	1,953,667
Wheat ..... bush.	16,238,433	13,299,320	35,559,870	27,801,829	41,817,215	33,541,740	34,214,768	26,193,693
Corn-meal .... bbl.	178,150	145,530	211,591	136,084	178,839	176,393	131,885	178,257
Corn ....bush.	40,800,939	25,652,603	24,576,345	15,416,787	29,329,000	26,447,807	22,488,707	12,955,525
Flour and wheat, bush	31,452,968	19,313,280	53,292,710	36,078,484	61,903,250	45,855,380	53,921,423	35,962,028
Corn and meal, bush	41,513,539	26,234,723	25,422,709	15,961,123	30,044,356	27,253,379	23,016,247	13,668,553
Oats ....bush.	12,442,127	32,718	11,235,420	49,573	10,792,919	122,528	10,636,078	138,508
Rye ....do..	491,851	623,355	995,447	1,069,140	592,114	641,661	301,544	206,898
Barley........do..	3,964,441	17,402	2,444,206	40,040	2,770,000	3,560	4,710,598	110
Total........	89,864,926	46,221,478	93,390,492	53,198,360	106,102,639	73,876,508	91,685,890	49,976,097

The quantity of flour, wheat, and corn actually consumed in New York and its vicinity very considerably increased during 1875. The excess of consumption over that of 1874 is estimated, by leading commercial authority, at 307,821 barrels of flour, 2,579,994 bushels of wheat, and 7,848,857 bushels of corn. As a home-distributing center, New York occupies a far less important position than in years past. The immense increase in the receipts of raw grain within the last twenty years has been mainly for foreign export. The receipts of flour in that period have actually declined. The increase of facilities of transportation in the country has operated in favor of local manufacture, especially in the Eastern States. At the same time, the foreign demand has been directed to the raw material to sustain the milling interest of Europe. The mills in and around New York have also enlarged their operations, supplying a large portion of the demand formerly dependent upon western manufacture. The New York mills, having a better understanding of the requirements of foreign markets, especially of the tropical regions, have been enabled to absorb several branches of the export trade formerly supplied by mills in the interior.

During 1875, prices, at the beginning of each month, for superfine State and western flour ranged from \$3.90 @ \$4.30 per barrel in February to \$5.10 @ \$5.50 in September and October, falling to \$4.75 @ \$5 on the 1st of December; extra State opened at \$4.75 @ \$5, rose to \$5.85 @ \$6.40 August 1, and fell back to \$5.10 @ \$5.90 in December; western and southern extras, from about the same lower limit, ranged from \$2 @ \$3 higher. Wheat, No. 1 spring opened at \$1.20 @ \$1.25 per bushel January 1, fell to \$1.16 @ \$1.19 March 1, then rose to \$1.45 @ \$1.47 August 1, and finally receded to \$1.35 @ \$1.39 December 1; No. 2 ranged from 5 to 18 cents lower; western red and amber winter-wheat bore nearly the same prices, opening at \$1.20 @ \$1.32 January 1, and closing at \$1.15 @ \$1.45 December 1, the maximum, \$1.48 @ \$1.54, being August 1; western white ranged 5 to 10 cents higher. Corn opened at 86 @ 97, rose to 91 @ 93½ May 1, and fell to 73 @ 81 in June and July. Oats opened at 66 @ 70 and closed December 1 at 41 @51.

BOSTON.

The total receipts of grain, flour, and corn-meal during 1875 amounted to 18,273,539 bushels, an increase of 277,280 bushels, or 1.54 per cent.

over 1874. The flour trade shows a falling-off of 252,515 barrels, or $13\frac{1}{3}$ per cent. in the receipts, and of 16,548 barrels, or 5.7 per cent. of the exports. The receipts of wheat declined 20 per cent. and the exports 25 per cent. Of wheat and flour taken together, the receipts decreased 15 per cent. and the exports 14 per cent. Of corn-meal, the receipts fell from 97,938 barrels to 84,103 barrels, and the exports from 76,277 barrels to 73,848 barrels; but corn unmanufactured showed a remarkable increase, both in receipts and exports; the former rose from 3,303,641 bushels to 5,346,340 bushels, or 62 per cent., and the exports from 380,254 bushels to 1,551,776 bushels, or 308 per cent. The receipts of oats fell off 6 per cent., and of rye 16 per cent.; on the other hand, the receipts of barley increased 20 per cent. The receipts of oats, rye, and barley were absorbed by home consumption; the export being too small for notice in commercial statistics.

The damage done to the wheat-crop of 1875 is reflected in the character of the flour-receipts, which have sunk mostly to medium and low grades. Choice flour at the close of the year had become quite limited in supply, and high prices were anticipated for such grades during the coming year. The choice Saint Louis brands, so plentiful in this market previously, showed light stocks, and the fancy spring-wheat brands of the Northwest were coming into more general use. During the year, western superfines ranged from $4 to $5.75 per barrel; common extras from $4.50 to $6; Wisconsin and Minnesota extras, from $5 to $8; Ohio, Indiana, and Michigan white wheats, $5.50 to $7.50; Illinois and Saint Louis white wheats, $5.75 to $9; fancy Minnesota, from $6.75 to $9.50. The stock of flour on hand at the close of the year was estimated at about 250,000 barrels. The price of corn closed at about 25 cents lower than at the end of 1874. The quality of the receipts up to December 31 was unusually good. Of oats, the grades received were mostly quite ordinary, and the prices ruled 12 or 13 cents lower than at the close of 1874, at which time very few samples of No. 1 white had appeared in market.

The grain movement of the last four years was as follows:

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Exports.	Receipts.	Exports.	Receipts.	Exports.	Receipts.	Exports.
Flour ....bbl.	1, 586, 017	217, 586	1, 795, 272	231, 361	1, 890, 487	287, 718	1, 637, 972	271, 170
Wheat ....bush.	402, 426	151, 860	880, 747	486, 128	1, 362, 017	1, 062, 366	1, 035, 109	784, 941
Corn-meal ....bbl.	91, 538	63, 832	120, 296	84, 926	97, 938	76, 277	84, 103	73, 848
Corn ....bush.	5, 090, 755	1, 673, 769	3, 558, 363	162, 729	3, 303, 641	380, 254	5, 346, 340	1, 551, 776
Wheat and flour ...do..	8, 332, 511	1, 239, 790	9, 857, 107	1, 642, 933	10, 814, 452	2, 500, 956	9, 224, 969	2, 140, 791
Corn and meal.....do..	5, 456, 907	1, 929, 097	4, 039, 547	502, 433	3, 691, 793	685, 362	5, 682, 752	1, 847, 168
Oats ....do..	2, 725, 641	....	3, 663, 364	....	3, 037, 269	....	2, 833, 544	....
Rye ....do..	13, 989	....	33, 335	....	34, 273	....	28, 878	....
Barley.............do..	539, 038	....	332, 849	....	418, 615	....	503, 539	....
Total	17, 068, 086	....	17, 926, 202	....	17, 996, 402	....	18, 273, 682	....

PHILADELPHIA.

The flour and grain trade of Philadelphia shows an increase in all articles except corn, and, in some, a very large increase over the aggregates of 1874. The receipts of flour were 1,510,190 barrels, an increase of 7 per cent.; of wheat, 5,950,800 bushels, an increase of nearly 9 per cent.; of flour and wheat together, 13,501,750 bushels, an increase of 8 per cent.; of corn, 5,950,800 bushels, a small decrease; of oats,

4,820,400 bushels, a small increase; of rye, 260,480 bushels, an increase of 4 per cent.; of barley, 1,652, 700 bushels, an increase of 34 per cent.

The receipts and shipments of the last four years were as follows :

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Exports.	Receipts.	Exports.	Receipts.	Exports.	Receipts.	Exports.
Flour..............bbl.	987, 450	113, 036	994, 680	142, 386	1, 401, 700	....	1, 510, 190	160, 748
Wheat...........bush.	4, 160, 800	412, 761	4, 372, 800	1, 938, 310	5, 471, 700	....	5, 950, 800	3, 302, 054
Wheat and flour...do..	9, 098, 050	977, 941	9, 346, 200	2, 650, 240	12, 480, 200	....	13, 501, 750	4, 115, 794
Corn...............do..	8, 137, 380	3, 462, 473	8, 233, 400	2, 002, 368	5, 954, 700	....	5, 950, 800	4, 601, 586
Oats...............do..	5, 830, 400	....	5, 980, 565	....	4, 705, 000	....	4, 820, 400	33, 840
Rye................do..	320, 940	....	322, 600	....	249, 091	....	260, 480	....
Barley.............do..	730, 380	....	1, 066, 392	....	1, 236, 392	....	1, 652, 700	....
Total..............	24, 117, 150	....	24, 949, 157	....	24, 625, 383	....	26, 196, 130	....

BALTIMORE.

The flour and grain trade of Baltimore during 1875 receded from the advanced position it had attained during the previous year. The total receipts of wheat, (including flour,) corn, oats, and rye amounted to 22,883,479 bushels, a loss of 1,815,771 bushels, or nearly 8 per cent. Of flour, the number of barrels received from the West was 1,019,364 against 1,032,202 last year, but the city manufacture rose from 507,035 barrels in 1874 to 527,541 barrels in 1875. The receipts of wheat amounted to 4,409,670 bushels, a decline of 30 per cent.; of flour and wheat together, the receipts fell off from 14,086,019 bushels in 1874 to 12,244,295 bushels in 1875, a loss of 13 per cent. Corn increased about 2 per cent., while oats declined nearly 13 per cent., and rye 37 per cent. The exports of flour fell off 4½ per cent.; of wheat, 42 per cent.; of flour and wheat, 22 per cent.; the export of corn increased 17 per cent.

The wheat-crop of the regions immediately around Baltimore was unusually good; but that of the West, from which Baltimore had previously drawn, was short in quantity and depreciated in quality, having been injured by rain while standing in the shock. For this reason the flour received from the West was of an inferior grade to that of 1874. Prices of western flour consequently ruled higher in the latter part of the year. Howard-street superfine flour opened at $4 @ $4.50 per barrel January 1, and rose to $4.50@$5.50 August 15; in 1874, the variation was between $4 @ $4.50 December 1, and $5.50@$6.25 February 1. Western extra, during February and part of March, was quoted at $4.50 @ $5, and rose to $5 @ $5.75 during the autumn, with a slight decline at the close of the year. City Mills extra ranged from $6.25 @ $6.50 in the spring months, to $7.75 @ $8 in the middle of August. The prices of wheat ruled lower on the first day of each month than at the corresponding periods of 1874. Southern red ranged from $1.10 @ $1.48 per bushel, the highest being in August. Southern white corn opened at 78 @ 85 per bushel January 1, rose to 91 @ 92 August 1, and fell to 55 @ 70 December 1; the same grade in 1874 ranged from 70 @ 78 in January, to $1 @ $1.03 in October, with a subsequent decline to 80 @ 85 in December. Oats opened at 63 @ 65 January 1, rose to 72 @ 83 June 1, and fell to 40 @ 50 December 1. During 1874 the prices ruled higher at the close of the year than at the beginning. Rye rose from 97 @ $1 January 1, to $1.15 @ $1.17 May 1, and fell to 75 @ 85 December 1. No exports of oats or rye are noted.

The following figures show the grain movement of the last four years:

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
Flour ....bbl.	1, 175, 967	282, 553	1, 312, 612	359, 566	1, 539, 237	474, 758	1, 546, 905	453, 000
Wheat ....bush.	2, 456, 100	88, 025	2. 810, 917	1, 158, 097	6, 389, 834	3, 556, 848	4, 409, 670	2, 064, 344
Flour and wheat...do..	8, 335, 935	1, 500, 790	9, 373, 977	2, 955, 927	14, 086, 019	5, 930, 638	12, 244, 295	4, 329, 344
Corn ....do..	9, 045, 465	5, 157, 235	8, 330, 449	6, 003, 618	9, 355, 467	5, 959, 757	9, 567, 141	6, 980, 802
Oats ....do..	1, 959, 161	....	1, 255, 072	....	1, 139, 216	....	997, 514	....
Rye ....do..	90, 938	....	100, 519	....	118, 548	....	74, 529	....
Total	19, 431, 499	....	19, 060, 017	....	24, 699, 250	....	22, 883, 479	....

CINCINNATI.

The statistics of the grain trade of Cincinnati are mostly derived from the annual reports of the Chamber of Commerce, and represent commercial years instead of calendar years. The report of 1875, closing August 31, shows but a small part of the movement of the crops last harvested. The flour trade shows a decline of 10 per cent. in receipts and of 14 per cent. in shipments. The local business increased, while the quantity distributed to other points fell off greatly. The residue of receipts, after deducting shipments, was about 1,000 barrels greater in 1875 than in 1874, showing an increase in home consumption. Shipments to the South and East fell off, but the loss was partially compensated by the opening-up of a new direct trade with Europe. The quantity of spring-flour marketed at this point was greater than during the previous year, having met with an increasing demand among the bakers. At times during the year, it commanded prices equal and even superior to those of analogous grades of winter-flour. The quality of all kinds marketed during the year was excellent, and better than for several years previous. This resulted from the excellence of the wheat-crop of 1874 in regions tributary to the Cincinnati market, which enabled millers to produce a superior article of manufacture. The demand for the better grades has been increasing in the home trade, and was well sustained during the whole year, though prices showed a marked depression. Family flour averaged $5.43 per barrel against $6.60.4 the previous year; extra, $5.18.3 against $6.25.5. The increasing indications of a short wheat-crop, toward the close of the commercial year, produced a reaction until, in August, family flour was quotable at $7.50 @ $7.75 per barrel; a decline is noted, however, during August. The annual average prices of superfine flour for nineteen commercial years were as follows: 1856–'57, $5.77; 1857–'58, $4; 1858–'59, $5.33; 1859–'60, $4.60; 1860–'61, $4.45; 1861–'62, $4.08; 1862–'63, $5.03; 1863–'64, $6.39; 1864–'65, $7.67; 1865–'66, $7.32; 1866–'67, $9.45; 1867–68, $9.18; 1868–'69, $5.08½; 1869–'70, $4.62; 1870–'71, $5; 1871–'72, $6.06; 1872–'73, $5.56½; 1873–'74, $5.06¼; 1874–'75, $4.41.7. During the last four years, family flour averaged $7.37.2 in 1872, $7.46.8 in 1873, $6.60.4 in 1874, and $5.43 in 1875; and, during the same period, extra averaged $7.14.6 in 1872, $7.15 in 1873, $6.25.5 in 1874, and $5.18.3 in 1875.

The business in raw grain, in its general aggregates, varied in but a small degree from the previous year; the falling-off in some departments being largely compensated by the increase in the others. The quantity distributed to other points was slightly diminished; many of the sections usually supplied from Cincinnati enjoying crops of unusual

abundance. The diminution from this cause, however, was counteracted to a great extent by the low rates of freight to the seaboard, inducing shipments which otherwise would not have been made. The facilities of distribution from Cincinnati have been enlarging year by year, and a steady purpose has been manifest to use these advantages in building up the distributing trade of the city. But, after all, it is sufficiently evident that the market is to be chiefly one of consumption. This imparts to the business a steadiness of demand, a freedom from speculative influences, a uniformity of prices, and an elastic trade which is more satisfactory than the extreme fluctuations of a great distributing market.

The wheat-crop of 1874 in the region dependent upon the Cincinnati market was the best one harvested in ten years. It was well secured and of excellent quality. The market was well supplied during the course of the whole year. The receipts show a decline of 7 per cent., and amount to 1,135,388 bushels. The shipments, amounting to 600,622 bushels, fell off 35 per cent., leaving a residue for home consumption nearly 100,000 bushels greater than in 1874. During the larger part of the year, prices ruled very low. At the commencement, red winter ranged from \$0.90 to \$1.05 per bushel, with a slow, but steady, appreciation during the fall and winter, being quoted early in February at \$1.10 @ \$1.14. The uncertainty as to the growing crop created some fluctuations, and the settled indications of disaster, especially the continued heavy rains of summer through the Ohio Valley, raised the quotations, early in August, to \$1.50 @ \$1.75; but the apprehensions of general failure of the crop having been dissipated by better information; prices declined at the close of the year to \$1.40 @ \$1.55. During 1875, the average of red wheat of all grades was \$1.16.6 per bushel; during 1874, No. 2 averaged \$1.73.9, and during 1873 \$1.56.3; in 1872, No. 1 averaged \$1.57.7, and during 1871 \$1.27⅜.

The corn trade shows an increase in receipts of nearly 7 per cent.; the shipments declined about 8 per cent. The market was well supplied throughout the year at prices remunerative to the farmer. The crop of 1874 in quantity was not equal to even the diminished yield of 1873; but this deficiency was largely compensated by the superior quality of the grain. The low rates of freight stimulated shipments to New York, but the distributive trade to other points declined in volume. Prices ruled higher than in any year since 1870: prime mixed ear averaged 72½ cents compared with 60 cents in 1874 and 83⅛ in 1870. Quotations rose from 70 @ 71 cents at the commencement, or 8 @ 9 cents higher than at the opening of the previous year, to 85 @ 87 cents in September, 1874, with a decline of 10 @ 12 cents during October; the subsequent fluctuations were quite limited.

The oats market was well supplied throughout the year; the crop of 1874 having been abundant and of good quality and condition. The stock of old oats ran out earlier than usual, making a demand upon the incoming crop. The receipts amounted to 1,323,380 bushels against 1,372,464 the previous year. These aggregates do not include a very large amount brought into the city by wagons from the immediate neighborhood. The shipments were 193,242 bushels, a decline of 23,418 bushels. The low rates of transportation caused an increased shipment to New York and Baltimore; the exports to other points showing a considerable reduction. The supplies came mostly from Ohio, Indiana, Illinois, and Iowa. The demand was good, and prices were relatively higher than for any other grain except corn. The average quotation of No. 2 mixed oats was 59 cents per bushel against 48.2 the previous year; the quotations opened at 44 @ 46 and advanced to 68 @ 69 in May;

they fell off somewhat in June, but rallied to their maximum, 70 @ 71, about the 1st of August, and finally closed at 58 @ 62. The crop of 1875 was almost a total failure in the immediate vicinity.

The rye trade fell off 13 per cent. in receipts and 16½ per cent. in shipments. The supply was equal to the demand, and the grain of good quality. The average quotation of No. 2 was $1.05.8 per bushel against 92.9 in 1874 and 75.8 in 1873. The quotations opened at 83 @ 85, and advanced, with slight interruptions, to $1.23 @ $1.25 in May, the maximum of three years, but subsequently receded, closing at 87. The crop of 1875 in regions depending upon this market was large, but considerably damaged by rain in harvest; supplies of good rye were not expected to be very large.

The barley trade shows a small increase of receipts, with a decline in shipments. The market was well supplied. The crop of fall barley, raised mainly in the immediate vicinity, was large and of excellent quality, requiring but a small draught upon the spring crop. An increased receipt is noted from California in ships round Cape Horn to New York and thence by rail. Prices were somewhat below those of the previous year; the average price of No. 2 fall barley was $1.41 per bushel against $1.51¼ the previous year. The fall crop of 1875 was badly damaged by rain, and what was saved was of poor quality and condition. The spring crop will come into greater requisition than previously, and, fortunately, that of 1875 was, in the regions dependent on this market, generally good.

The receipts and shipments of flour and grain at Cincinnati during the last four years were as follows:

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
Flour .... bbl.	582, 930	410, 501	765, 469	560, 829	774, 916	551, 774	697, 578	473, 460
Wheat .... bush.	762, 144	323, 405	860, 454	412, 722	1, 221, 176	783, 990	1, 135, 388	600, 622
Flour and wheat ... do..	3, 676, 794	2, 375, 910	4, 687, 799	3, 216, 767	5, 095, 756	3, 542, 860	4, 623, 278	2, 967, 922
Corn .... do..	1, 892, 866	246, 632	2, 259, 544	324, 183	3, 457, 164	658, 718	3, 695, 561	595, 915
Oats .... do..	1, 160, 053	230, 963	1, 529, 979	324, 718	1, 372, 464	216, 660	1, 323, 380	193, 242
Rye .... do..	357, 309	110, 464	426, 660	61, 577	385, 934	117, 349	336, 410	98, 245
Barley .... do..	1, 177, 306	26, 984	1, 228, 245	37, 456	1, 084, 500	90, 688	1, 109, 693	82, 723
Total	8, 264, 328	2, 990, 953	10, 122, 227	3, 964, 701	11, 395, 818	4, 626, 275	11, 088, 322	3, 938, 047

The cereal movement, as a whole, shows a decrease in the receipts of 1,307,496 bushels, or 11 per cent., and in the shipments a decline of 688,228 bushels, or about 14 per cent. The residue of receipts, after deducting shipments, was 6,150,275 bushels against 5,769,543 in 1874, an increase of 380,732 bushels, indicating a home consumption nearly 7 per cent. greater than during the previous year. As a consumptive market, Cincinnati is enlarging its operations; as a distributing market, it shows some curtailment from last year's aggregates, which, however, is evidently but temporary, and due to the action of special circumstances.

CHICAGO.

The receipts of flour at Chicago during 1875 (calendar year) were 2,625,883 barrels against 2,666,679 in 1874, 2,487,376 in 1873, 1,532,014 in 1872, 1,412,177 in 1871, and 1,766,037 in 1870. The city manufactures in 1875 were 249,653 barrels; in 1874, 244,667; in 1873, 264,363; in 1872,

186,968; in 1871, 327,739; in 1870, 443,967. The shipments in 1875 were 2,285,113 barrels; in 1874, 2,306,576; in 1873, 2,303,490; in 1872, 1,361,328; in 1871, 1,287,574; in 1870, 1,705,977. The flour market throughout 1875 was dull and depressed, with a very precarious and unsatisfactory margin of profits. European purchasers directed their attention more exclusively to the purchase of wheat to supply their own mills, thus lessening the amount of flour shipped from Chicago by foreign parties. Many country mills hitherto sending their products to this market had opened a direct trade with the East and even with Europe. The short wheat-crop of 1875 still further reduced the flour movement, but the decline from all these causes was partly compensated by an increased home consumption. The western winter-wheat was inferior, and had a "ground smell" which rendered shippers suspicious of its keeping qualities. The same misgivings were felt in regard to the first receipts of the spring crop, part of which was secured in very indifferent order. But these suspicions were allayed by the improved character of later receipts. Fair to good shipping extras averaged $4.92 per barrel against $5.01 in 1874. Medium to choice samples of spring flour opened at $4.25 @ $5.25, and closed the year about 50 cents higher, reaching $5.30 @ $6.50 during the latter part of summer. Considerable fluctuations grew out of conflicting reports of the condition of the growing wheat-crops.

The receipts of wheat during 1875 amounted to 24,206,370 bushels; in 1874, 29,764,622; in 1873, 26,266,562; in 1872, 12,724,141; in 1871, 14,439,656; in 1870, 17,394,409. The shipments of 1875 were 23,184,349 bushels; of 1874, 27,634,587; of 1873, 24,455,657; of 1872, 12,160,046; of 1871, 12,905,449; of 1870, 16,432,585. Though the wheat movement shows lower aggregates in 1875, commercial authorities state that the amount actually handled in Chicago was greater than in any former year. An unusual proportion of the crop of 1875 was of very low grade; during the first month after the new crop began to come in, only 39 per cent. reached No. 2, and, at the close of October, only 60 per cent. was above No. 3. The export demand was smaller than in 1875, and there was a notable absence of "corners" to disturb the market. The latter circumstance is attributed to the more stringent regulation of the Board of Trade. Outside "fancy" operators, in unusual numbers, had diverted their attention from the stock market to the wheat market; but their speculative enterprise netted no very encouraging results. In her rivalry with Milwaukee, Chicago has of late years gained almost the whole trade of Minnesota, but has lost half of that of Iowa and a fourth of that of Nebraska. Some discrepancies in the classification of wheat in the two cities are complained of; this difficulty can be met only by a more thorough and general classification, embracing the wheat markets of the whole country. The average price per bushel of No. 2 was $1.02½ against $1.08½ in 1874 and $1.17½ in 1873.

The receipts of corn in 1875 were 28,341,150 bushels; in 1874, 35,799,638; in 1873, 38,157,232; in 1872, 47,366,087; in 1871, 41,853,138; in 1870, 20,189,775. The shipments of 1875 were 26,443,884 bushels; of 1874, 32,705,222; of 1873, 36,754,943; of 1872, 47,013,552; of 1871, 36,716,030; of 1870, 17,777,377. The trade was very disappointing to all concerned, and especially to speculators. The average price was 63¾ cents per bushel against 65 cents in 1874, 37 cents in 1873, and 38½ in 1872. The crop of the regions dependent upon the Chicago market was not of very high quality, giving but little inducement to the storage of large supplies.

The receipts of oats for 1875 were 12,916,428 bushels; 1874, 13,901,235;

1873, 17,888,724; 1872, 15,061,715; 1871, 14,789,414; 1870, 10,472,078. The shipments of 1875 were 10,279,134 bushels; 1874, 10,561,673; 1873, 15,694,133; 1872, 12,255,537; 1871, 12,151,247; 1870, 8,507,835. The market of 1875 still felt the demoralizing effects of the "corners" of the previous year. The crop of 1875 in regions dependent upon the Chicago market exceeded general expectations both in quantity and in quality. Prices averaged 47 cents per bushel against 46 in 1874, 28¾ in 1873, and 29½ in 1872.

The receipts of rye amounted to 699,583 bushels, a decline of one-eighth; the shipments were 310,592 bushels, a fall of 7½ per cent. from the previous year. The average price of No. 1 during the first seven months of 1875 was exactly $1 per bushel; for the whole year it was 88¼. Only the poorer qualities of the late crop have been thoroughly marketed, and much of good quality still remains in first hands, though stocks are generally reported as light.

The receipts of barley were 3,107,297 bushels, a decrease of 247,684 bushels; the shipments were 1,868,206 bushels, a decrease of 536,332 bushels. The light crop of 1874, and the consequent excess of demand, caused a large area to be sown in the Northwest, and a heavy yield is reported, but in many places damaged seriously by bad weather. The average price of No. 2 for the year was $1.26 per bushel.

The flour and grain movement for the past four years is represented in the following table:

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
Flour.........bbl.	1, 532, 014	1, 361, 328	2, 487, 376	2, 303, 490	2, 666, 679	2, 306, 576	2, 625, 883	2, 285, 113
Wheat......bush.	12, 724, 141	12, 160, 046	26, 266, 562	24, 455, 657	29, 764, 622	27, 634, 587	24, 206, 370	23, 184, 349
Flour and wheat, bush.............	20, 384, 211	18, 966, 686	38, 703, 442	35, 973, 107	43, 098, 017	39, 167, 467	37, 335, 785	34, 609, 914
Corn........bush.	47, 366, 087	47, 013, 552	38, 157, 232	36, 754, 943	35, 799, 638	32, 705, 224	28, 341, 150	26, 443, 884
Oats..........do..	15, 061, 715	12, 255, 537	17, 888, 724	15, 694, 133	13, 901, 235	10, 561, 673	12, 916, 428	10, 279, 134
Rye ....do..	1, 129, 086	776, 805	1, 189, 464	960, 613	791, 182	335, 077	699, 583	310, 592
Barley....... do..	5, 251, 750	5, 032, 308	4, 240, 239	3, 366, 041	3, 354, 981	2, 404, 538	3, 107, 297	1, 868, 206
Total	89, 192, 849	84, 044, 888	100, 179, 101	92, 748, 837	96, 945, 053	85, 173, 979	82, 400,243	73, 511, 730

MILWAUKEE.

The receipts of flour at Milwaukee during 1875 amounted to 1,443,801 barrels against 1,616,338 in 1874, 1,254,821 in 1873, 834,202 in 1872, 796,782 in 1871, 824,799 in 1870, and 807,763 in 1869. The manufactures were 746,126 barrels in 1875, 735,481 in 1874, 634,102 in 1873, 560,206 in 1872, 567,893 in 1871, 530,049 in 1870, and 481,511 in 1869. The total of receipts and manufactures was 2,189,927 in 1875, 2,351,819 in 1874, 1,888,923 in 1873, 1,394,408 in 1872, 1,364,675 in 1871, 1,354,848 in 1870, and 1,289,274 in 1869. The shipments were 2,163,346 in 1875, 2,217,579 in 1874, 1,805,200 in 1873, 1,231,986 in 1872, 1,211,427 in 1871, 1,225,941 in 1870, and 1,220,058 in 1869. The secretary of the Chamber of Commerce calls attention to the fact that the above figures represent only *bona-fide* receipts and shipments, and that the reprehensible practice of adding the amount *in transitu* to other points has been repudiated in his statistical report. The milling business was generally unprofitable, although the scarcity of superior winter-wheat grades in the country created a great demand for fancy brands of spring-wheat flour, especially the patent springs, which have largely superseded the

winter-wheat brands in the consumptive markets. The falling-off in the receipts being greater than in the shipments left the market considerably bare, and considerable dullness resulted at times from the lack of material on which to operate. The commission business greatly declined on account of the system adopted by country millers, hitherto dependent upon the Milwaukee market, of sending traveling-agents to solicit orders for direct shipment to eastern markets. The commission merchants were almost daily in receipt of orders which they were unable to fill. The fluctuation in prices did not average more than $1.25 per barrel during the year. Spring extras opened in January at $4.20 @ $5 per barrel and closed at $4 @ $5.40; the maximum, $5.25 @ $6.75, continued through the greater part of August. Patent springs opened and closed at $6.50 @ $8.25, having fallen during June and July to $5.50 @ $7. Spring superfines rose from $3.25 @ $3.75 to $4 @ $5, but fell to their opening quotations.

Of wheat unmanufactured, the receipts amounted to 27,878,727 bushels in 1875, 25,628,143 in 1874, 28,457,937 in 1873, 13,618,959 in 1872, 15,686,611 in 1871, 18,883,837 in 1870, and 17,745,238 in 1869. The shipments were 22,681,020 bushels in 1875, 22,255,380 in 1874, 24,994,266 in 1873, 11,570,575 in 1872, 13,409,467 in 1871, 16,127,838 in 1870, and 14,272,799 in 1869. The receipts of annual crops for the seven years were as follows: 1868, 16,028,296 bushels; 1869, 19,880,437; 1870, 15,957,061; 1871, 12,217,036; 1872, 20,294,501; 1873, 32,034,185; 1874, 23,312,377. The receipts of the crop of 1875 to the close of the year amounted to 14,302,942 bushels. The amount manufactured into flour during 1875 was 3,357,567 bushels, an aggregate substantially the same as during the previous year. The aggregate receipts of 1875 prior to harvest were about 2,000,000 bushels less than during the same period of 1874; but, from harvest to the end of the year, the receipts were about 4,000,000 bushels greater. The quality of the crop of 1875 received since harvest averages higher than the previous one. Of these receipts, 38.87 per cent. graded as No. 1 against 21.5 per cent. during the same period of 1874. If the later receipts of the crop of 1875 exhibit the same tendencies as its predecessor, the per cent. of No. 1 wheat will be much greater, as the poorer grades were first marketed and the better retained by the farmer. Of the eleven last crops, the largest proportion of No. 1 wheat, 77 per cent., is shown by the crop of 1865; whereas that of 1866 graded only 10.8 per cent. as No. 1; the crop of 1866 shows by far the largest per cent. of rejected wheat, 9.70 per cent. The aggregate sales of wheat on change during 1875 amounted to 193,270,000 bushels, averaging 629,000 bushels per day; this aggregate is 55,449,000 bushels greater than that of 1874. The heaviest monthly transactions, covering 27,735,000 bushels, are reported in July. Since 1868, No. 2 spring-wheat has been the leading grade in this market; it ruled very low during the fore part of the year and up to April, when it ran up to $1.05 per bushel, but fell below $1 till the middle of June, when it rose above $1; reaching its maximum, $1.16½ @ $1.34, in August, and falling to $0.96 @ $1.05½ in December. This decline was the result of a considerable visible supply at the close of the year.

The consolidated receipts of wheat, and flour reduced to its equivalent in wheat, during 1875 were 35,097,732 bushels against 33,709,833 in 1874, 34,732,042 in 1873, 17,789,969 in 1872, 19,670,521 in 1871, 23,007,832 in 1870, and 21,784,053 in 1869. The shipments of 1875 were 33,497,750 bushels; of 1874, 33,343,275; of 1873, 34,020,266; of 1872, 17,730,505; of 1871, 19,466,602; of 1870, 22,257,543; of 1869, 20,373,089.

During 1875, the receipts of corn amounted to 949,605 bushels against

1,313,642 in 1874, 921,391 in 1873, 2,140,178 in 1872, 1,151,382 in 1871, 435,318 in 1870, and 487,564 in 1869. The shipments were 226,985 bushels in 1875, 556,563 in 1874, 197,920 in 1873, 1,601,412 in 1872, 419,133 in 1871, 103,173 in 1870, and 93,806 in 1869. The receipts of this market are almost entirely for home consumption, chiefly for the manufacture of high-wines. Special efforts have been made of late years to increase the receipts; but, for lack of transportation and storage facilities, the supply has been but little beyond the needs of local consumption. Prices opened in January, 1875, at 63 cents per bushel, and closed in December at 48 cents, the minimum of the year; fluctuations were noted during the spring which raised the quotations to a maximum of 74 cents in April. The trade has been quite irregular and artificial, in consequence of the stimulus employed to direct a larger supply to this market than would have naturally sought it.

The receipts of oats during 1875 amounted to 1,643,132 bushels against 1,403,889 in 1874, 1,763,058 in 1873, 1,597,726 in 1872, 1,121,950 in 1871, 638,098 in 1870, and 722,949 in 1869. The shipments were 1,160,450 bushels in 1875, 726,039 in 1874, 990,525 in 1873, 1,338,028 in 1872, 772,929 in 1871, 210,187 in 1870, and 351,768 in 1869. During the first half of 1875, prices ruled high, from 51 to 61½ cents per bushel, greatly curtailing local consumption; but, during the latter half of the year, there was a rapid declension to 31 cents the first week in December, with a slight subsequent reaction. These figures do not embrace local deliveries by farmers in the immediate vicinity, of which no statistics are accessible.

The receipts of rye in 1875 amounted to 230,834 bushels against 284,522 in 1874, 376,634 in 1873, 409,573 in 1872, 466,341 in 1871, 190,593 in 1870, and 203,804 in 1869. The shipments of 1875 were 98,923 bushels against 74,879 in 1874, 255,928 in 1873, 209,751 in 1872, 208,896 in 1871, 62,494 in 1870, and 120,662 in 1869. The residue of receipts over shipments, with about an equal amount raised by neighboring farmers, was absorbed in the local consumption of the city. Prices opened at 96½ cents per bushel, and rose to $1.18 on the first of May, falling to $1 before harvest, with a subsequent decline to 68½ cents at the close of the year.

During 1875, the receipts of barley were 1,286,535 bushels against 1,083,472 in 1874, 1,209,474 in 1873, 1,447,078 in 1872, 874,070 in 1871, 585,971 in 1870, and 247,499 in 1869. The shipments were 867,970 in 1875, 464,837 in 1874, 688,455 in 1873, 938,725 in 1872, 576,453 in 1871, 469,325 in 1870, and 78,035 in 1869. The residue of receipts over shipments in 1875, with a large amount from farms near the city, including the best qualities of the market, was consumed by Milwaukee brewers, whose purchases for consumption during the year amounted to 767,815 bushels. The receipts included 100,000 bushels from Canada, all of which were taken for home consumption. The shipments were all by rail. The prices of 1875 showed considerable steadiness; the extreme range being not over 40 cents per bushel. The highest price for No. 2 barley was $1.36 per bushel, in May, and the lowest 94 cents, at the close of the year.

The flour and grain movements at Milwaukee during the last four years were as follows:

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
Flour..........bbl.	834, 202	1, 231, 986	1, 254, 821	1, 805, 200	1, 616, 338	2, 217, 579	1, 443, 801	2, 163, 346
Wheat.......bush.	13, 618, 959	11, 570, 575	28, 457, 937	24, 994, 266	25, 628, 143	22, 255, 380	27, 878, 727	22, 681, 020
Flour and wheat, bushels..........	17, 789, 969	17, 730, 505	34, 732, 042	34, 020, 266	33, 709, 833	33, 343, 275	35, 097, 732	33, 497, 750
Corn.........bush.	2, 140, 178	1, 601, 412	921, 391	197, 920	1, 313, 642	556, 563	949, 605	226, 985
Oats............do..	1, 597, 726	1, 338, 028	1, 763, 058	990, 525	1, 403, 889	726, 039	1, 643, 132	1, 160, 450
Rye............do..	409, 573	209, 751	376, 634	255, 928	284, 522	74, 879	230, 834	98, 923
Barley.........do..	1, 447, 078	938, 725	1, 209, 474	688, 455	1, 083, 472	464, 837	1, 286, 585	867, 970
Total........	23, 384, 584	21, 818, 421	39, 003, 599	36, 153, 094	37, 795, 628	35, 165, 593	39, 207, 888	34, 852, 078

SAINT LOUIS.

The flour and grain trade of Saint Louis suffered a general decline during 1874, though one article, corn-meal, showed an increase in local production, with a decrease of receipts from other points. The receipts of flour from other points amounted to 1,300,381 barrels, a decrease of nearly 23 per cent. from the figures of the previous year. The amount manufactured was 1,424,821 barrels, a decline of 9 per cent. The total amount marketed, including imports and manufactures, was 2,725,202 barrels, a loss of 17 per cent. from the figures of 1874. The shipments were 2,480,877, a decline of nearly 17 per cent. The amount taken for city consumption fell from 216,927 barrels in 1874 to 199,706 in 1875. The stock left over at the close of 1873 was 58,848 barrels; 1874, 117,261; 1875, 161,880. The inferior quality of the wheat-crop of 1875 in the regions around Saint Louis is attested by the fact that half of the new-crop arrivals during the year proved unsound upon inspection. The number of new brands on the market was somewhat surprising; but this fact indicated the difficulty of keeping up the standard of old brands. The most marked falling-off in receipts was from Southern Illinois. The decline in shipments was nearly equal eastward and southward; but westward there was a small increase. It is remarkable that, while the river shipments to the South fell off about 400,000 barrels, the rail shipments to the same quarter increased about 110,000 barrels. The trade with New England and the East was interfered with, to a considerable extent, by the spring-wheat flour of other points, especially the patent springs. The large crop and low price of spring-wheat gave a temporary advantage to this new trade.

Of twenty-seven mills operating in Saint Louis during 1875, twenty decreased their aggregate production by 291,396 barrels, while the other seven increased their product 143,015 barrels. The capital employed in this manufacture was $3,031,000, and the total flour and corn-meal product, together with the offal, was valued at $13,632,500; 589 employés received in wages $439,900.

Besides the receipts and local manufactures, Saint Louis millers and dealers handled and shipped direct from country mills to distant markets a very considerable amount of flour. The following table shows the

amount of this outside shipment for eight years, together with the city receipts and manufactures:

Products.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
	Barrels.	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*
Received	805, 836	1, 310, 555	1, 491, 626	1, 428, 408	1, 259, 933	1, 296, 457	1, 683, 898	1, 300, 381
Manufactured	895, 154	1, 068, 592	1, 351, 773	1, 507, 915	1, 294, 798	1, 420, 287	1, 573, 202	1, 424, 821
Shipped from other points.	245, 824	297, 860	407, 561	364, 043	440, 631	324, 891	228, 789	304, 721
Total	1, 946, 814	2, 677, 007	3, 250, 960	3, 300, 366	2, 995, 362	3, 041, 635	3, 485, 889	3, 029, 923

The direct shipments for the last five years were in the directions indicated in the following table:

Shipments.	1871.	1872.	1873.	1874.	1875.
	Barrels.	*Barrels.*	*Barrels.*	*Barrels.*	*Barrels.*
South by boat	1, 451, 183	1, 214, 326	1, 200, 045	1, 186, 799	797, 039
South by rail	304, 014	302, 904	323, 078	533, 077	643, 641
East by rail	888, 124	677, 905	893, 761	1, 223, 694	985, 092
East by boat	11, 466	5, 369	951	8, 918	21, 383
Westward	15, 946	42, 268	16, 799	22, 481	27, 659
To local points	5, 792	4, 268	5, 581	6, 791	6, 063
Total	2, 676, 525	2, 247, 040	2, 440, 215	2, 981, 760	2, 480, 877

The prices of family winter-wheat flour opened in January at \$5.75 @ \$6.25, and rose, with some fluctuations, to the maximum \$7.50 @ \$7.75 about the beginning of August, and then sunk to \$6.25 @ \$6.50 at the close of the year. Spring extra rose from \$4.20 @ \$4.30 at the beginning of the year to \$6 in the beginning of August, and gradually sunk to \$3.75 @ \$4.50 at the close of the year.

The receipts of wheat were 7,064,265 bushels, a decline of 8 per cent. from 1874. Of the receipts, 1,562,454 bushels were shipped to other points, a decline of nearly 20 per cent.; 772,866 bushels remained in store at the close of the year, and 5,785,099 bushels were ground by the city mills; the latter item shows a decline from 1874 of about 4 per cent. The annual receipts for eleven years were as follows: 1865, 3,452,722 bushels; 1866, 4,410,305; 1867, 3,571,593; 1868, 4,353,591; 1869, 6,736,454; 1870, 6,638,253; 1871, 7,311,910; 1872, 6,007,987; 1873, 6,185,038; 1874, 8,255,221; 1875, 7,604,265. No. 2 red winter-wheat opened at \$1.06½ per bushel and closed at \$1.40½; the maximum, \$1.75, being about the beginning of October. The total receipts of wheat, including flour reduced to its equivalent in grain, was 13,566,170, a decline of 18 per cent. from 1874. The decline was in the first half of the year; the remaining half showing a positive increase. Baltimore and Richmond mills drew heavily on the Saint Louis market until advancing prices and the poor quality of the last crop caused them to cease buying. Large supplies from Arkansas and Texas excited considerable attention. The crop in the southern portions of the country was not subjected to the storms which so seriously injured it in the Northwest, and hence the receipts from the Southwest were of good quality and in greatly-increased quantity.

The receipts of corn amounted to 6,710,263 bushels, a decline of 4 per cent. from 1874. Of these receipts 3,523,974 were shipped, a falling-off of 15 per cent.; 2,000,752 bushels were ground into meal, an increase of 6 per cent.; 961,223 bushels were taken for city consumption, an increase of nearly 4 per cent.; 412,598 bushels were left over at the end of the

year against 188,284 the previous year. The receipts of corn for eleven years were as follows: 1865, 3,162,310 bushels; 1866, 7,233,671; 1867, 5,155,480; 1868, 2,800,277; 1869, 2,395,713; 1870, 4,708,838; 1871, 6,030,734; 1872, 9,479,387; 1873, 7,701,187; 1874, 6,991,677; 1875, 6,710,263. No. 2 mixed corn was quoted at the beginning of the year, at 65⅜ @ 66 cents per bushel, rose to 77 cents at the beginning of April, and gradually fell to its minimum (39¾ @ 40½) at the close of the year.

The receipts of corn-meal in 1875 amounted to 31,706 barrels, falling off 8 per cent. from 1874; the amount manufactured by the Saint Louis mills was 480,557 barrels, an increase of 6 per cent.; the receipts and manufactures amounted to 512,263 barrels, a net increase of about 5 per cent.; the exports amounted to 420,399 barrels, an increase of 4 per cent.; kiln-dried corn-meal opened at $3.35 @ $3.50 per barrel, and closed at $2.05 @ $2.25; touching its maximum, $3.90, in June.

The receipts of oats amounted to 5,006,850 bushels, a decline of nearly 6 per cent. from 1874; 2,145,561 bushels were taken for city consumption, a decline of 6 per cent.; 2,877,035 were shipped to other points, a decline of 7½ per cent.; leaving on hand at the close of the year 89,078 bushels against 104,824 at the close of the previous year. The receipts of the last eleven years were as follows: 1865, 4,173,227 bushels; 1866, 3,568,253; 1867, 3,445,388; 1868, 3,259,132; 1869, 3,461,814; 1870, 4,519,510; 1871, 4,358,099; 1872, 5,467,800; 1873, 5,359,853; 1874, 5,296,967; 1875, 5,006,850. No. 2 mixed oats opened in January at 57½ @ 57⅝ cents per bushel, and closed at 44 cents; the maximum, 68 @ 68½, was in the second week of April; and the minimum, 32 @ 32¾, was in November. While the receipts of the first six months fell behind the corresponding period of 1874 by 580,000 bushels, during the latter half of the year there was an increase of 290,000 bushels. The receipts of the crop of 1875 were quite inferior to those of 1874.

The receipts of rye amounted to 275,200 bushels, a decline of over 4½ per cent. from 1874; 116,093 bushels were taken for consumption, falling off 17 per cent.; 134,960 bushels were shipped, a decline of 18 per cent.; at the close of the year, 26,589 bushels were left over against 2,442 bushels at the close of 1874. The seizure of many city distilleries by the General Government for violation of the revenue-laws caused almost an entire cessation in the local demand, and consequently prices fell. Similar troubles in New Orleans caused the shipment to that port to fall off almost entirely; but this loss was largely compensated by an increase in eastern shipments. The quantity of rye-flour manufactured was also decreased by 3,129 barrels, still further narrowing the demand for the grain. No. 2, or prime rye, opened in January at $1 per bushel, and closed at 67 cents; its maximum, $1.08, was in April, and its minimum, 66 cents, in the first week of December. The amount of rye-flour manufactured was 19,303 barrels against 21,432 in 1874, 19,472 in 1873, 14,060 in 1872, 19,307 in 1871, and 8,558 in 1870. Prices opened at $5.75 @ $6.25 per barrel, and closed at $4.50 @ $4.75. The annual receipts of rye for eleven years were as follows: 1865, 217,568 bushels; 1866, 375,417; 1867, 250,704; 1868, 367,961; 1869, 266,056; 1870, 210,542; 1871, 374,336; 1872, 377,587; 1873, 356,580; 1874, 288,743; 1875, 275,200.

The receipts of barley amounted to 171,337 bushels, or 17½ per cent. less than in 1874; 1,007,512 bushels were consumed in the city, showing a decline of 11⅝ per cent. from the previous annual consumption; 146,330 bushels were shipped elsewhere, a decline of 35 per cent. The amount left over at the end of the year was 117,815 against 100,320 at the close of 1874. The receipts of barley for eleven years were as fol-

lows: 1865, 846,230 bushels; 1866, 548,797; 1867, 705,215; 1868, 634,591; 1869, 757,600; 1870, 778,518; 1871, 876,217; 1872, 1,263,486; 1873, 1,158,615; 1874, 1,421,406; 1875, 1,171,337. The crops of the region marketing at Saint Louis were poor, and the receipts embraced an unusual percentage of unsound and low-grade grain. The unsound grain had been used in previous years to a large extent by the distilleries; but the practical closing of the whisky manufacture by prosecutions for violation of revenue-laws left no market for the refuse grades. The capital invested in brewing during the year was $3,144,310; hands employed, 624; aggregate of wages paid, $530,940; total product, 380,054 barrels, equal to 11,781,674 gallons, of an aggregate value of $4,003,315. Prices for barley opened at $1.40 @ $1.45 per bushel, and closed at $1.20 @ $1.25; the maximum, $1.54, was paid about May 1, for choice California grain.

The flour and grain movements of the past four years at Saint Louis were as follows:

Products.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
Flour .... bbl.	1, 259, 933	2, 447, 040	1, 296, 457	2, 506, 215	1, 683, 898	2, 981, 760	1, 300, 381	2, 480, 877
Wheat .... bush.	6, 007, 987	918, 477	6, 185, 038	1, 210, 286	8, 255, 221	1, 938, 841	7, 604, 265	1, 562, 453
Corn .... do..	9, 479, 387	8, 079, 739	7, 701, 187	5, 260, 916	6, 991, 677	4, 148, 556	6, 710, 263	3, 523, 974
Corn-meal ..... bbl.	51, 207	234, 938	39, 278	358, 736	34, 595	402, 871	31, 706	420, 399
Flour and wheat, bushels	12, 307, 652	13, 153, 677	12, 667, 323	13, 741, 361	16, 674, 711	16, 847, 641	14, 106, 170	13, 966, 838
Corn and corn-meal, bushels	9, 684, 215	9, 019, 491	7, 858, 299	6, 695, 860	7, 130, 057	5, 760, 040	6, 837, 087	5, 205, 570
Oats .... bush.	5, 467, 800	3, 467, 594	5, 359, 853	3, 215, 206	5, 296, 967	3, 027, 663	5, 006, 850	2, 877, 035
Rye .... do..	377, 587	150, 208	356, 580	206, 652	288, 743	166, 133	275, 200	134, 960
Barley .... do..	1, 263, 486	87, 566	1, 158, 615	125, 604	1, 421, 406	227, 418	1, 171, 337	146, 330
Total	29, 100, 743	25, 878, 536	27, 400, 670	24, 084, 683	30, 811, 884	26, 028, 895	27, 396, 644	22, 330, 733

RECAPITULATION.

The comparative receipts and shipments of flour and grain at the foregoing points may be tabulated as follows:

Flour, barrels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	3, 042, 907	1, 202, 792	3, 546, 568	1, 655, 331	4, 017, 207	2, 462, 728	3, 941, 331	1, 953, 667
Boston	1, 586, 017	217, 586	1, 795, 272	231, 361	1, 890, 487	287, 718	1, 637, 972	271, 170
Philadelphia	987, 450	113, 036	994, 680	142, 386	1, 401, 700	....	1, 510, 190	160, 748
Baltimore	1, 175, 967	282, 553	1, 312, 612	359, 566	1, 539, 237	474, 758	1, 546, 905	453, 000
Cincinnati*	582, 930	410, 501	765, 469	560, 829	774, 916	551, 774	697, 578	473, 460
Chicago	1, 532, 014	1, 361, 328	2, 487, 376	2, 303, 490	2, 666, 679	2, 306, 576	2, 625, 883	2, 285, 113
Milwaukee	834, 202	1, 231, 986	1, 254, 821	1, 805, 200	1, 616, 338	2, 217, 579	1, 443, 801	2, 163, 346
Saint Louis†	1, 259, 933	2, 447, 040	1, 296, 457	2, 506, 215	1, 683, 898	2, 981, 760	1, 300, 381	2, 480, 877
San Francisco‡	....	247, 088	....	479, 418	....	535, 695	....	497, 163

* Commercial years ending August 31.

† Does not include home manufacture, which in 1871 amounted to 1,294,798 barrels; in 1872, to 1,294,798 barrels; in 1873, to 1,420,287 barrels; in 1874, to 1,581,000 barrels; in 1875, to 1,424,821 barrels.

‡ Barrels contain two centals, or 200 pounds of flour.

Wheat, bushels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	16, 238, 433	13, 299, 320	35, 559, 870	27, 801, 829	41, 817, 215	33, 541, 740	34, 214, 768	26, 193, 693
Boston	402, 426	151, 860	880, 747	486, 128	1, 362, 017	1, 062, 366	1, 035, 109	784, 941
Philadelphia	4, 160, 800	412, 761	4, 372, 800	1, 938, 310	5, 471, 700	....	5, 950, 800	3, 302, 054
Baltimore	2, 456, 100	88, 025	2, 810, 917	1, 158, 097	6, 389, 834	3, 556, 848	4, 409, 670	2, 064, 344
Cincinnati *	762, 144	323, 405	860, 454	412, 722	1, 221, 176	783, 990	1, 135, 388	600, 622
Chicago	12, 724, 141	12, 160, 046	26, 266, 562	24, 455, 657	29, 764, 622	27, 634, 587	24, 206, 370	23, 184, 349
Milwaukee	13, 618, 959	11, 570, 575	28, 457, 937	24, 994, 266	25, 628, 143	22, 255, 380	27, 878, 727	22, 681, 020
Saint Louis	6, 007, 987	918, 477	6, 185, 038	1, 210, 286	8, 255, 221	1, 938, 841	7, 604, 265	1, 562, 453
San Francisco	....	10, 118, 971	....	15, 293, 266	....	13, 424, 450	....	12, 508, 333

* Commercial years.

Wheat, including flour reduced to bushels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	31, 452, 968	19, 313, 280	53, 292, 710	36, 078, 484	61, 903, 250	45, 855, 380	53, 921, 423	35, 962, 028
Boston	8, 332, 511	1, 239, 790	9, 857, 107	1, 642, 933	10, 814, 452	2, 500, 956	9, 224, 969	2, 140, 791
Philadelphia	9, 098, 050	977, 941	9, 346, 200	2, 650, 240	12, 480, 200	....	13, 501, 750	4, 105, 794
Baltimore	8, 335, 935	1, 500, 790	9, 373, 977	2, 955, 927	14, 086, 019	5, 930, 638	12, 224, 295	4, 329, 344
Cincinnati	3, 676, 794	2, 375, 910	4, 687, 799	3, 216, 867	5, 095, 756	3, 542, 860	4, 623, 278	2, 967, 922
Chicago	20, 384, 211	18, 966, 686	38, 703, 442	35, 973, 107	43, 098, 017	39, 167, 467	37, 335, 785	34, 609, 914
Milwaukee	17, 789, 969	17, 730, 505	34, 732, 042	34, 020, 266	33, 709, 833	33, 343, 275	35, 097, 732	33, 497, 750
Saint Louis	12, 307, 652	13, 153, 677	12, 667, 323	13, 741, 361	16, 674, 711	16, 847, 641	14, 106, 170	13, 966, 838
San Francisco	....	11, 354, 411	....	17, 690, 356	....	16, 102, 925	....	....

Corn, bushels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	40, 800, 939	25, 652, 603	24, 576, 345	15, 416, 787	29, 329, 000	26, 447, 807	22, 488, 707	12, 955, 525
Boston	5, 090, 755	1, 673, 769	3, 558, 363	162, 729	3, 303, 641	380, 254	5, 346, 340	1, 551, 776
Philadelphia	8, 137, 380	3, 462, 473	8, 233, 400	2, 202, 368	5, 954, 700	....	5, 950, 800	4, 601, 586
Baltimore	9, 045, 465	5, 157, 235	8, 330, 449	6, 003, 618	9, 355, 467	5, 959, 757	9, 567, 141	6, 980, 802
Cincinnati	1, 892, 866	246, 632	2, 259, 544	324, 183	3, 457, 164	658, 718	3, 695, 561	595, 915
Chicago	47, 366, 087	47, 013, 552	38, 157, 232	36, 754, 943	35, 799, 638	32, 705, 224	28, 341, 150	26, 443, 884
Milwaukee	2, 140, 178	1, 601, 412	921, 391	197, 920	1, 313, 642	556, 563	949, 605	226, 985
Saint Louis	9, 479, 387	8, 079, 739	7, 701, 187	5, 260, 916	6, 991, 677	4, 148, 556	6, 710, 263	3, 523, 974

Oats, bushels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	12, 442, 127	32, 718	11, 235, 420	49, 573	10, 792, 919	122, 528	10, 636, 078	138, 508
Boston	2, 725, 641	....	3, 663, 364	....	3, 037, 269	....	2, 833, 544	....
Philadelphia	5, 830, 400	....	5, 980, 565	....	4, 705, 000	....	4, 820, 400	33, 840
Baltimore	1, 959, 161	....	1, 255, 072	....	1, 139, 216	....	997, 514	....
Cincinnati	1, 160, 053	230, 963	1, 529, 979	324, 718	1, 372, 464	216, 660	1, 323, 380	193, 242
Chicago	15, 061, 715	12, 255, 537	17, 888, 724	15, 694, 133	19, 901, 235	10, 561, 673	12, 916, 428	10, 279, 134
Milwaukee	1, 597, 726	1, 338, 028	1, 763, 058	990, 525	1, 403, 889	726, 039	1, 643, 132	1, 160, 450
Saint Louis	5, 467. 800	3, 467, 594	5, 359, 853	3, 215, 206	5, 296, 967	3, 027, 663	5, 006, 850	2, 877, 035
San Francisco	....	31, 781	....	17, 891	....	244, 856	....	....

Rye, bushels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	491, 851	623, 355	995, 447	1, 069, 140	592, 114	641, 661	301, 544	206, 898
Boston	13, 989	....	33, 335	....	34, 273	....	28, 878	....
Philadelphia	320, 940	....	322, 600	....	249, 091	....	260, 480	....
Baltimore	90, 938	....	100, 519	....	118, 548	....	74, 529	....
Cincinnati	357, 309	110, 464	426, 660	61, 577	385, 934	117, 349	336, 410	98, 245
Chicago	1, 129, 086	776, 805	1, 189, 464	960, 613	791, 182	335, 077	699, 583	310, 592
Milwaukee	409, 573	209, 751	376, 634	255, 928	284, 522	74, 879	230, 834	98, 923
Saint Louis	377, 587	150, 208	356, 580	206, 652	288, 743	166, 133	275, 200	134, 960

Barley, bushels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	3, 964, 441	17, 402	2, 444, 206	40, 040	2, 770, 000	3, 560	4, 710, 598	110
Boston	539, 038	....	332, 849	....	418, 615	....	503, 539	....
Philadelphia	730, 380	....	1, 066, 392	....	1, 236, 392	....	1, 652, 700	....
Cincinnati	1, 177, 306	26, 984	1, 228, 245	37, 456	1, 084, 500	90, 688	1, 109, 693	82, 723
Chicago	5, 251, 750	5, 032, 308	4, 240, 239	3, 366, 041	3, 354, 981	2, 404, 538	3, 107, 297	1, 868, 206
Milwaukee	1, 447, 078	938, 725	1, 209, 474	688, 455	1, 083, 472	464, 837	1, 286, 585	867, 970
Saint Louis	1, 263, 486	87, 566	1, 158, 615	125, 604	1, 421, 406	227, 418	1, 171, 337	146, 330
San Francisco	....	314, 559	....	465, 875	....	379, 636	....	....

All grains, including flour reduced to bushels.

Cities.	1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
New York	89, 196, 926	46, 221, 478	93, 390, 492	53, 198, 360	106, 102, 639	73, 876, 508	91, 685, 890	49, 976, 097
Boston	17, 068, 086	....	17, 926, 202	....	17, 996, 402	....	18, 273, 682	....
Philadelphia	24, 117, 150	....	24, 949, 157	....	24, 625, 383	....	26, 196, 130	....
Baltimore	19, 431, 499	....	19, 060, 017	....	24, 699, 250	....	22, 883, 479	....
Cincinnati	8, 264, 328	2, 990, 953	10, 122, 227	3, 964, 701	11, 395, 818	4, 626, 275	11, 088, 322	3, 938, 047
Chicago	89, 192, 849	84, 044, 888	100, 179, 101	92, 748, 837	96, 945, 053	85, 173, 979	82, 400, 243	73, 511, 730
Milwaukee	23, 384, 584	21, 818, 421	39, 003, 599	36, 153, 094	37, 795, 628	35, 165, 593	39, 207, 888	34, 852, 078
Saint Louis	28, 895, 912	24, 938, 874	27, 243, 558	22, 549, 739	30, 673, 504	24, 417, 411	27, 269, 820	20, 649, 137

LIVE-STOCK MARKETS.

NEW YORK.

Live-stock operations during 1875 were very unsatisfactory to dealers. The shock of the financial panic of 1873 had greatly disturbed this as well as other branches of trade. The distress falling upon the laboring classes, who are generally the largest consumers of meat, crippled their capacity to purchase, and consequently limited their demand. Large numbers of people were out of employment, or earning wages too small to admit of the use of animal food to any extent. Some dealers, attempting to extend credit to these classes, suffered severe losses. This has increased the anxiety that has long been felt by intelligent dealers to bring the meat business to a cash basis, as this would admit

of smaller margins both in buying and selling. During the last decade, each year has witnessed a large increase in animals marketed, but the past year shows a loss in beeves and hogs and a small increase in sheep and calves. Had there been an average prosperity in commerce and industry, the increasing population would have required the usual increase in the meat supply.

The receipts of different classes of farm animals for eight years past were as follows:

Animals.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.
Beeves	293,101	325,761	356,026	380,934	425,275	442,744	454,033	453,060
Cows	5,382	4,836	5,050	4,646	5,089	4,701	3,676	5,034
Calves	82,935	93,984	116,457	121,937	115,130	116,015	104,719	117,580
Sheep	1,400,623	1,479,563	1,463,878	1,331,975	1,179,518	1,206,715	1,165,353	1,228,530
Swine	976,511	901,308	899,625	1,334,492	1,922,777	1,958,389	1,774,228	1,388,541

Cattle.—The number of beeves marketed in 1875 was 453,060, a decrease of 973 from 1874; of milch-cows, 5,034, an increase of 1,358; of calves, 117,580, an increase of 12,861. The range of prices of beeves at the close of the first week of each month of 1875, and the average price, were as follows: January, range, $7.75 @ $12.75 per cental, average $11; February, range $7 @ $13.50, average $10.50; March, $7.25 @ $13.25, average $11; April, $9 @ $13.25, average $11; May, $9.50 @ $13.25, average $11; June, $8.50 @ $13.50, average $12; July, $6.50 @ $13.50, average $12; August, $6.50 @ $13.50, average $11.50; September, $7 @ $13.50, average $11; October, $7.50 @ $13.25, average $10.75; November, $7 @ $13.25, average $10; December, $7.50 @ $13, average $10.75. The average of all grades during the year was $11. The range of prices per head of milch-cows at the beginning of each of the first nine months of 1875 was as follows: January, $40 @ $80; February, $45 @ $90; March, $40 @ $80; April, $50 @ $75; May, $40 @ $70; June, $50 @ $90; July, $50 @ $108; August, $40 @ $100; September, $45 @ $75. Veal-calves touched their minimum, $4.50 per cental, in April and June, and their maximum, $10.50, in January and February.

Sheep.—The number of sheep marketed in 1875 was 1,228,530, an increase of 63,177 over 1874. The range of prices of all grades at the beginning of each month of 1875 was as follows: January, $6 @ $7.50 per cental; February, $5.50 @ $8; March, $5.37½ @ $7.75; April, $5.50 @ $7.50; May, $5 @ $8; June, $5.25 @ $7; July, $4.25 @ $8.50; August, $4.25 @ $6.25; September, $4.50 @ $6.50; October, $5.25 @ $7.25; November, $4.75 @ $6; December, $4.50 @ $6.50.

Swine.—The number marketed in 1875 was 1,388,541, a decline of 385,687 from the figures of 1874. Prices at the beginning of the year were $7.50 @ $8 per head, and about the same at the close; at the beginning of July they reached $9.25 @ $9.75.

BUFFALO.

Horses.—Receipts, 18,187; shipments, 14,581.

Cattle.—Receipts, 513,530, an increase of 8,936; estimated aggregate value of receipts, $33,892,980 against $33,305,204 in 1874 and $26,889,056 in 1873; shipments in 1875, 493,574.

Sheep.—Receipts, 841,000, a gain of 57,200; aggregate value of receipts, $4,205,000 against $3,997,380 in 1874 and $4.003,700 in 1873; shipments, 722,800.

Swine.—Receipts, 1,067,300 against 1,431,800 in 1874; aggregate value of receipts, $16,009,500 against $17,181,600 in 1874 and $16,625,000 in 1873; shipments, 907,800.

Summary.—Aggregate value of cattle, sheep, and swine, $54,107,480 against $54,482,184 in 1874 and $47,517,756 in 1873.

BALTIMORE.

Cattle.—The annual receipts of cattle for nine years were as follows: 1867, 55,713 head; 1868, 75,891; 1869, 91,000; 1870, 89,021; 1871, 88,386; 1872, 92,292; 1873, 94,664; 1874, 130,946; 1875, 113,379. Of the receipts of 1865, 65,000 were taken by local butchers, 25,000 for stock in York and Carroll Counties, and the residue shipped eastward. An approximate estimate gives the aggregate value of the receipts at $3,500,000. Prices per cental on the 15th of each month of 1875 were as follows:

Months.	Common to fair.	Good to prime.	Months.	Common to fair.	Good to prime.
January	$3 00 to $3 75	$4 87 to $7 00	July	$3 50 to $5 00	$5 00 to $7 40
February	4 00 to 5 00	5 50 to 7 25	August	3 25 to 4 50	4 50 to 7 12
March	3 00 to 4 50	5 00 to 7 50	September	2 50 to 4 75	5 00 to 6 50
April	3 75 to 5 00	5 25 to 7 37	October	3 00 to 4 75	4 87 to 6 25
May	3 00 to 5 00	5 00 to 6 50	November	2 00 to 4 75	5 50 to 6 50
June	4 00 to 5 00	5 00 to 7 50	December	2 00 to 4 75	4 87 to 6 50

Beef products—Butter.—The receipts of butter during 1875 are estimated at 5,680,840 pounds. The brand known as "Glades" butter was promptly disposed of, scarce a pound remaining unsold. The butter trade was on the whole quite satisfactory. Prime Glades opened at its maximum, 28 @ 30 cents per pound, and closed at 24 @ 28, reaching its minimum (17 @ 20) in April and May; prime near-by receipts opened at 26 @ 29, and closed at 27 @ 30, reaching as low as 16 @ 19 in July; prime western kept about the same course as that last named. Very few accumulations in the hands of dealers are noted during the year. Eastern factory cheese ranged from 11 to 16½ cents, and western factory about 1 cent lower.

Swine.—The receipts of hogs for six years were as follows: 1870, 300,000 head; 1871, 307,436; 1872, 400,874; 1873, 392,734; 1874, 357,547; 1875, 277,496. Nearly all the receipts of 1875 were slaughtered for consumption in the city and its immediate neighborhood. The aggregate value has been estimated in round numbers at 4,000,000. The comparative prices per cental of live hogs on the 15th of each month of the past four years were as follows:

Months.	1872.	1873.	1874.	1875.
January	$6 00 to $7 25	$5 50 to $6 00	$7 50 to $7 87	$9 25 to $9 75
February	6 50 to 7 26	6 25 to 6 85	7 37 to 8 75	9 50 to 10 50
March	6 50 to 7 25	7 00 to 7 75	7 00 to 7 87	9 25 to 10 00
April	6 00 to 6 75	7 50 to 8 50	7 50 to 8 37	11 00 to 12 00
May	5 50 to 6 50	7 00 to 7 37	7 00 to 8 00	10 00 to 11 50
June	5 75 to 6 25	6 25 to 7 25	7 50 to 8 25	9 75 to 10 50
July	6 00 to 6 50	6 75 to 7 25	8 50 to 9 25	9 50 to 10 50
August	6 50 to 7 25	7 25 to 7 50	8 00 to 10 50	10 25 to 11 25
September	7 25 to 7 50	6 75 to 7 25	8 00 to 10 50	10 00 to 11 50
October	6 50 to 7 00	6 00 to 7 00	9 50 to 9 75	10 00 to 10 62
November	5 75 to 6 50	5 25 to 6 00	8 25 to 9 00	9 50 to 10 25
December	5 00 to 5 50	7 00 to 7 50	9 00 to 9 50	9 00 to 9 75

Swine products.—Of the western pork product of 1874–'75, it is estimated that at least 140,000,000 pounds were distributed through the Baltimore market against 124,158,000 in 1874, 111,568,000 in 1873, and 100,000,000 in 1872. Foreign exports fell off on account of high prices, but home consumption expanded to absorb all the old product before the season of 1875–'76 had opened. Baltimore still continues to be the great distributing point for the South. The export trade in lard has regularly fallen off in each of the last three years. The comparative exports of seven years were as follows: 1869, 1,864,140 pounds; 1870, 1,791,360; 1871, 4,876,760; 1872, 12,622,649; 1873, 11,596,004; 1874, 11,129,969; 1875, 8,520,006. Prices of mess-pork ranged from $20 to $20.25 on the 15th of January, and $21.50 in December; maximum, $23.50 @ $24, in October; minimum, $19.50 @ $19.75, in March.

CINCINNATI.

Cattle.—The receipts of the "commercial year" ending August 31, 1875, amounted to 227,450, an increase of 14 per cent. compared with the previous twelve months; shipments, 103,438, an increase of 30 per cent., showing a marked relative growth of the distributive trade of the city. The facilities for handling live stock have been greatly increased by the establishment of the "United Railroads' Stock-Yards." The quality of the cattle marketed was not equal to that of the preceding twelve months. The grass of the cattle-regions dependent upon the Cincinnati market had been flooded with rain, and presented a rapid growth, but its defective nutrition was generally complained of. Inundations in a large portion of this area, by destroying immense quantities of stock-food, compelled the premature marketing of animals. Hence there was an unusual number of low grade on the market. Texas cattle were brought up in increasing numbers and of improved character, and in many cases rivaled native stock. The short time now required for their transportation and the extension of railway-lines to the cattle-districts enable stockmen of the Southwest to place their animals on the market in excellent condition. The better class of the cattle received are for home consumption, and the lower grades constitute the staple of the distributing trade. The market enjoyed a good steady demand throughout the year.

The annual receipts and shipments of all kinds of cattle, with the annual average price of prime beeves per cental, for eighteen commercial years, are given in the following table:

Commercial years.	Receipts.	Shipments.	Annual average prices per cental of prime beeves.	Commercial years.	Receipts.	Shipments.	Annual average prices per cental of prime beeves.
1857–'58	29,566	17,115	$3 78	1866–'67	91,946	43,070	$7 27½
1858–'59	43,100	23,615	4 88	1867–'68	87,459	43,315	7 27
1859–'60	43,182	20,503	3 90	1868–'69	107,813	40,185	5 62½
1860–'61	40,585	19,357	3 30	1869–'70	107,167	54,681	5 85
1861–'62	37,004	23,467	3 24	1870–'71	125,771	53,278	5 05.2
1862–'63	31,915	16,739	3 96	1871–'72	169,855	76,866	4 73½
1863–'64	39,152	14,903	5 74	1872–'73	149,629	53,385	4 99 1-6
1864–'65	54,424	19,070	7 45	1873–'74	199,426	79,551	4 28
1865–'66	79,503	31,300	7 55	1874–'75	227,450	103,438	4 28

The average weight of cattle weighed at the cattle-yards during the year was 944.63 pounds per head against 952.22 the previous year. The heaviest averages of 1875 were in February, March, and April, exceeding 1,000 pounds; the minimum, 681.34 pounds, was in May.

Cattle products—Butter.—The butter trade suffered some reaction during the last commercial year. The receipts had been greatly enlarged by the stimulus of the profitable trade of the previous twelve months, and the high prices continued after the opening of the last commercial year. So early as October, it became apparent that the market was being overstocked, and a decline of prices set in, which, however, only operated to induce enlarged operations by dealers in the hope of a speedy reaction. But the general weakening of prices throughout the country disappointed such hopes, and great losses were experienced by speculators, some of whom were compelled to sell 15 or 20 cents per pound less than the purchase-price. Later in the year, prices somewhat improved. The receipts embraced 812 barrels and 65,910 firkins and kegs against 416 barrels and 53,449 firkins and kegs the year before. The average annual prices of choice Central Ohio during eighteen commercial years were as follows: Year ending August 31, 1858, 15 cents; 1859, 19 cents; 1860, $14\frac{1}{3}$ cents; 1861, $13\frac{1}{6}$ cents; 1862, $12\frac{1}{2}$ cents; 1863, $11\frac{1}{2}$ cents; 1864, 29 cents; 1865, 35 cents; 1866, $36\frac{1}{3}$ cents; 1867, $26\frac{1}{2}$ cents; 1868, $36\frac{1}{2}$ cents; 1869, $32\frac{7}{8}$ cents; 1870, $28\frac{1}{3}$ cents; 1871, $24\frac{5}{8}$ cents; 1872, 20.04 cents; 1873, 23.2 cents; 1874, 27 cents; 1875, 25.33 cents.

Cheese.—The receipts of cheese during the last commercial year amounted to 173,144 boxes, a falling-off of nearly 5 per cent. from the previous twelve months. The average annual quotations for factory cheese for the last five commercial years were as follows: 1871, $13\frac{3}{4}$ cents per pound; 1872, $14\frac{1}{2}$ cents; 1873, $14\frac{1}{2}$ cents; 1874, $14\frac{3}{4}$ cents; 1875, 14 cents. For fifteen previous years, Western Reserve cheese averaged as follows: 1856, 9.7 cents; 1857, 10.1 cents; 1858, 8.1 cents; 1859, 8.2 cents; 1860, $8\frac{1}{2}$ cents; 1861, 7.8 cents; 1862, 6.3 cents; 1863, 10.4 cents; 1864, 14 cents; 1865, $19\frac{3}{4}$ cents; 1866, $19\frac{1}{3}$ cents; 1867, $11\frac{1}{2}$ cents; 1868, $14\frac{1}{4}$ cents; 1869, $16\frac{1}{2}$ cents; 1870, 17 cents.

Tallow.—The supply was light, the receipts being but 33,397 tierces, or 15 per cent. less than the preceding year; the shipments were 3,804, a little over a third of the previous year's shipments. The cattle slaughtered in the later portion of the year were in comparatively poor condition and deficient in fat. The foregoing figures do not include the tallow produced in the city. The average quotations of the last three years were as follows: 1873, 8.4 cents per pound; 1874, 7.4 cents; 1875, 8.5 cents. Prices were quite steady and the fluctuations very limited during the year.

Hides.—The receipts of 1875 were 177,525 pieces and 213,812 pounds against 161,192 pieces and 172,999 pounds the previous twelve months; shipments, 128,961 pieces and 102,720 pounds against 103,293 pieces and 86,238 pounds the previous year. Dry flint hides averaged 17 cents per pound against $18\frac{1}{2}$ in 1874 and 20 in 1873.

Sheep.—The receipts of sheep were 273,102, an increase of $13\frac{1}{3}$ per cent. compared with the previous twelve months; shipments, 172,007, an increase of 66 per cent. The increased yarding facilities have given rise to a great extension of the distributive trade of the city. Though the causes depressing the average quality of cattle operated to some extent upon the sheep marketed here, the quality of the receipts of 1875 was nearly equal to that of the preceding year. The demand was fair. The average price of sheared sheep was $4.89 per cental gross against

$4.50 the preceding year. The receipts and shipments of eighteen commercial years were as follows:

Year.	Receipts.	Shipments.	Year.	Receipts.	Shipments.	Year.	Receipts.	Shipments.
1858	17,896	4,363	1864	35,223	4,077	1870	90,205	35,581
1859	29,064	6,025	1865	47,023	5,815	1871	134,892	51,109
1860	25,069	6,724	1866	73,229	13,177	1872	187,522	68,541
1861	22,041	6,000	1867	91,987	24,052	1873	131,633	62,755
1862	27,453	7,433	1868	73,097	19,809	1874	240,161	101,975
1863	25,900	4,745	1869	117,548	31,353	1875	273,102	172,007

Sheep products—Wool.—The receipts of wool were 14,668 bales, averaging about 100 pounds each, a loss of 17½ per cent. compared with the trade of the previous year; the shipments were 14,260 against 14,743 the previous year. Shipments to the East have increased, as the delaine, combing, and medium clothing wools here marketed are better adapted to eastern fabrics than to those of Cincinnati. On the other hand, the demand of western manufactures has not been so active. Ohio fleece-washed wools opened at 42 @ 43 cents per pound, but by midsummer had declined to 38 @ 40, and remained without material change. This was the reason why so large a proportion of the clip was left in the hands of the farmers. Kentucky wools, on the contrary, were early disposed of at 42 @ 43 cents, and, when once in the hands of the dealers, fell to 40 @ 42. Pulled wools are in but small supply, and declining each year. A larger proportion of wool is now marketed in the unwashed state. The receipts and shipments of twelve years were as follows:

Year.	Receipts.	Shipments.	Year.	Receipts.	Shipments.	Year.	Receipts.	Shipments.
1864	14,005	12,913	1868	11,851	12,461	1872	11,082	12,177
1865	11,014	12,953	1869	13,827	15,058	1873	9,213	10,657
1866	17,099	15,670	1870	11,971	15,655	1874	17,723	14,743
1867	15,490	13,995	1871	16,728	19,432	1875	14,668	14,260

The average weight of sheep weighed at the stock-yards was 81.04 pounds per head against 80.93 pounds the preceding year.

Swine.—The receipts of live hogs during the commercial year of 1875 amounted to 920,889, a decline of 18 per cent. compared with the preceding year; the shipments were 149,264, a decline of 48 per cent. The receipts, shipments, and values of hogs in the market during the last six years were as follows:

Year.	Receipts.	Value of receipts.	Value per head.	Shipments.	Value of shipments.	Value per head.
1869-'70	484,894	....	....	47,534	....	....
1870-'71	650,935	$10,414,960	$16 00	62,171	$994,736	$16 00
1871-'72	1,015,885	12,825,548	12 09	159,390	2,012,299	12 00
1872-'73	1,119,482	12,182,762	10 90	265,385	2,123,080	8 00
1873-'74	1,121,707	14,582,191	13 00	290,094	3,191,034	11 00
1874-'75	920,889	16,659,790	18 09	149,264	2,350,908	15 75

The year, though involving no disaster to the trade, was one of constant anxiety in regard to the final result. Operations opened for the packing-season in a slow reluctant way; the impression being that the high prices of hogs would not warrant a heavy investment, but as the winter advanced there was no indication of a permanent decline. The opening quotation was $5.85 @ $6.75 per cental, which, at the close of

February, had risen to \$6 @ \$7.40; the average price for winter-packing was \$6.99.17 against \$4.58.24 the previous season. The money paid for the hogs alone was \$10,511,807 against \$7,477,947 the previous year, or an excess of \$3,043,960. The prices of the cured pork at the close of the year were less than the previous year, leaving a very narrow margin for the packers. The latter were glad to escape serious disaster.

The number of hogs winter-packed at Cincinnati during the last sixteen commercial years, with their average weight and yield of lard per head, were as follows:

Years.	Number packed.	Average cost per cental, gross.	Average weight per head.		Average yield of lard.	
			Net.	Gross.	All kinds.	Leaf and trimmings.
			Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1860	434,499	....	189	....	....	23
1861	433,799	....	221.2	....	....	23.56
1862	474,467	....	224.68	....	....	29.28
1863	608,457	....	203	....	....	25.91
1864	370,623	....	188.92	....	....	23.17
1865	350,600	....	201.125	....	....	24.2
1866	354,079	....	238.58	....	....	32.52
1867	462,610	....	232.28	....	....	30.5
1868	366,831	....	210.18	....	....	25.18
1869	356,555	....	214.375	....	....	25.17
1870	337,330	....	226.33	....	....	27.125
1871	481,560	....	239.07	298.8	42.62	31.2
1872	630,301	\$4 36.4	231.36	289.2	41.02	29.6
1873	626,305	3 92.3	....	304.9	45.67	....
1874	581,523	4 58.2	....	280.75	39.7	....
1875	560,164	6 96.17	....	278.25	41.77	....

Of the number packed in 1875, 19,830 were butchers' hogs slaughtered for consumption, leaving 540,334, a decrease, compared with the previous year, of 40,919. But as the average gross weight per head was less, the number packed was equivalent to only 535,517 of the standard of the previous year, showing a real decline of 45,736 hogs. The aggregate gross weight, not including butchers' hogs, was 150,346,488 pounds, a decrease of 12,841,527. The average gross weight per head was 278.25, a loss of 2.5 pounds. The aggregate yield of lard, not including butchers' hogs, was 22,571,799 pounds, a loss of 504,986 pounds.

The average gross weight of 705,637 hogs received at the stock-yards was 255.14 pounds; during the previous year, 773,780 hogs averaged 248.34 pounds.

Hog-products.—The product of barreled pork resulting from the operations of the packing-season proper included 38,262 barrels of mess, 694 of prime mess, 2,770 of clear, and 2,506 of rump; the results of the previous season included 27,204 barrels of mess, 941 of prime mess, 75 of clear, and 2,534 of rump.

The total value of pork and bacon was \$2,580,593 against \$3,130,719 in 1874, \$3,731,375 in 1873, \$3,682,575 in 1872, and \$2,628,931 in 1871. The aggregate value of the shipments was \$12,645,468 against \$14,536,289 in 1874, \$15,536,289 in 1873, \$12,981,151 in 1872, and \$9,114,278 in 1871. The packages of pork being of various dimensions, it is not practicable to give the exact quantities marketed at this point. The same is true of lard, of which the total receipts of 1875 were valued at \$1,622,255 against \$1,532,901 in 1874, \$1,288,247 in 1873, \$1,277,355 in 1872, and \$1,557,989 in 1871. The shipments were valued at \$4,403,346 against \$4,062,932 in 1874, \$3,504,851 in 1873, \$3,531,327 in 1872, and \$5,563,564 in 1872.

CHICAGO.

The total value of all kinds of live stock received during 1874 in the Chicago market was $117,533,941, an increase of nearly 14 per cent. over the values of 1874. Of this sum, $1,134,600 represented horses, a loss of 35 per cent.; $46,042,150 the cattle-trade, a gain of 28 per cent.; $68,461,925 the swine-trade, an increase of 7 per cent.; $1,895,266 the sheep-trade, an increase of 39 per cent.

Horses.—The monthly receipts and shipments of horses for the last three years were as follows:

Months.	1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
January	627	467	688	604	483	562
February	2,135	1,978	2,538	2,376	1,222	1,141
March	4,253	3,909	3,838	3,690	2,784	2,781
April	2,913	2,801	2,739	2,672	2,083	1,835
May	2,666	2,663	1,603	1,607	1,376	1,407
June	2,737	2,276	1,807	1,508	1,150	1,096
July	1,104	984	804	839	648	715
August	1,073	1,002	853	760	416	414
September	1,340	1,254	838	888	431	424
October	779	609	1,251	1,223	293	323
November	422	370	423	256	271	260
December	240	227	206	185	172	151
Total	20,289	18,540	17,588	16,608	11,329	11,109

The value per capita is estimated somewhat lower in 1875 than during the two previous years.

Cattle.—The number of cattle received was 920,843, an increase of 76,882 head, or 8 per cent. over 1874; the shipments were 696,534, an increase of 73,605, or nearly 12 per cent. The receipts and shipments of the last five years were as follows:

Months.	1871.		1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
January	30,708	16,639	44,990	33,047	50,520	30,564	59,438	44,771	64,951	43,694
February	43,299	28,782	41,087	36,146	45,019	35,509	52,775	43,719	58,142	44,113
March	44,752	39,578	53,705	43,170	63,836	56,477	72,542	59,935	80,149	65,314
April	48,144	43,522	58,393	52,474	84,249	68,531	77,346	66,733	92,374	82,888
May	59,217	49,455	71,700	67,039	81,602	80,261	77,373	72,993	80,736	72,170
June	52,564	44,637	63,449	52,335	85,380	68,818	89,274	68,728	90,481	70,384
July	50,041	39,754	58,439	41,928	73,207	54,505	65,118	48,299	65,471	52,624
August	50,583	36,007	64,463	47,211	67,731	49,726	73,308	50,541	85,948	61,948
September	53,175	38,528	66,744	43,179	65,394	44,301	73,761	45,854	82,495	55,294
October	37,981	22,759	64,957	34,388	63,845	34,162	85,193	50,161	84,763	62,301
November	42,781	20,378	55,884	32,468	37,712	23,351	65,530	37,643	72,003	42,462
December	29,805	21,393	40,799	26,105	42,933	27,976	52,308	33,552	63,330	43,342
Total	543,050	401,432	684,610	509,490	761,428	574,181	843,966	622,929	920,843	696,534

The increase of shipments being larger than that of receipts shows a comparative growth of the distributive trade of the city. A large proportion of the receipts were shipped alive, and consequently a smaller proportion were slaughtered for home consumption or for beef-packing for export. The business of 1875 was the largest ever done at any point on the world's surface. The receipts of April, 92,374, show

the largest monthly business ever transacted. This enormous accession of animals could not fail to overtax even the splendid facilities of the Chicago market and to absorb all the available space in the stock-yards. It also made the market to run very slow, the ordinary demand being exceeded. The accessions of the spring months were mostly native steers, cows, &c., from the region immediately dependent upon Chicago. Large receipts came from Texas, with which State Chicago is strengthening and multiplying her railway connections. The transportation of cattle from this region now requires but six days, causing but little decline of flesh and condition compared with the former system of transport. Kansas, Nebraska, Colorado, Wyoming, and the Indian Territory also contributed largely to the receipts. The season was not one of profit to native feeders, prices having ruled lower than for several years previous. The fluctuations in prices also rendered the drovers' business somewhat precarious in its profits. The receipts of the first half of the year in quality compare favorably with former years, but there was a considerable falling-off in the last six months in this respect. Texas cattle, with a diminished supply, show a more desirable quality. The preparation of dressed beef for exportation is a growing business in Chicago; the points of shipment being generally the manufacturing towns of the East. The business was also pursued at various points west of the Mississippi, and the carcasses marketed at Chicago interfered to some extent with the retail butcher trade of that city. Prices of live cattle during the last months of the year fell to a point which seemed inconsistent with any trade movement whatever. The year closed up in discouragement, with a bad outlook for the future, and many traders were contemplating other investments of their capital. This was in strong contrast with the close of 1874, when a strong market with active demand and high prices were confidently predicted. Stock and feeding cattle opened at $3 @ $4 per cental, and gradually rose to $5.50 in the spring, but sank to about the opening quotations at the close of the year; common to choice cattle ranged from $2.90 @ $7.50 down to $2.25 @ $6.15.

Cattle-products—Beef.—The number of cattle packed during the last ten seasons was as follows: 1865-'66, 27,172; 1866-'67, 25,996; 1867-'68, 35,348; 1868-'69, 26,950; 1869-'70, 11,963; 1870-'71, 21,254; 1871-'72, 16,080; 1872-'73, 15,755; 1873-'74, 21,712; 1874-'75, 41,192. Of barreled beef the receipts during 1875 amounted to 26,949 barrels against 36,670 in 1874, 7,158 in 1873, 14,512 in 1872, 53,289 in 1871, 20,554 in 1870, and 1,478 in 1869, showing a very irregular supply from other points; the shipments amounted to 60,454 in 1875, 72,562 in 1874, 33,938 in 1873, 39,911 in 1872, 89,452 in 1871, 65,369 in 1870, and 48,624 in 1869, showing a considerable fluctuation in the distributive trade. Mess-beef ranged from $8 to $10 per barrel during the year, the higher prices being sustained during the latter half of the year; extra mess ranged about $1 higher.

Tallow.—Receipts, 3,259 tons against 3,374 in 1874 and 4,203 in 1873; shipments, 3,701 tons against 4,051 in 1874 and 5,787 in 1873. Prices opened at 8 @ $8\frac{1}{4}$ cents per pound and closed at 9; the maximum, $9\frac{3}{4}$ @ $9\frac{7}{8}$, being in the second week of October.

Hides. — Receipts, 52,309,872 pounds against 52,287,674 in 1874, 36,885,241 in 1873, and 32,287,995 in 1872; shipments, 54,838,561 pounds against 48,780,931 in 1874, 30,725,408 in 1873, and 28,959,292 in 1872. The volume of trade shows some increase, but it is complained of as unprofitable. The demand was small for light hides, through the continued depression in leather manufactures in the East; but heavy Texas and

Cherokee hides were in fair request for sole-leather. The direct export to Europe shows a marked increase. Prices of dry flint hides fell off regularly from 18 @ 19 cents per pound at the opening to 15 cents at the close of the year; dry salted from 16 @ 17 to 12 cents; green salted from 8½ @ 9½ to 7½ cents; green and stock averaged 8½ during the year.

Butter and cheese.—Receipts of butter, 30,243,247 pounds against 25,573,309 in 1874, 22,283,275 in 1873, and 14,574,777 in 1872; shipments, 16,356,558 pounds against 16,295,253 in 1874, 12,851,303 in 1873, and 11,497,537 in 1872. The receipts of cheese are estimated at 12,000,000 pounds; prices, during the first five months of 1875, averaged 16 cents per pound and 11 cents during the remainder of the year.

Sheep.—The receipts of sheep were 418,948 head, an increase of 80,293, or nearly 24 per cent.; the shipments were 240,604, an increase of 60,049, or 36 per cent. The monthly receipts and shipments were as follows:

Months.	1871.		1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
January	35, 111	17, 576	42, 069	23, 235	39, 751	20, 787	29, 173	15, 621	58, 162	41, 898
February	43, 608	25, 512	41, 803	25, 348	27, 729	24, 723	41, 586	27, 545	42, 571	27, 924
March	42, 213	29, 321	38, 170	29, 495	31, 061	23, 020	34, 866	26, 630	50, 985	36, 702
April	23, 379	13, 084	24, 771	17, 328	75, 570	12, 798	26, 100	19, 233	41, 952	30, 359
May	23, 337	8, 557	16, 389	5, 945	21, 030	8, 653	20, 218	11, 319	16, 476	6, 006
June	22, 667	6, 496	13, 776	3, 493	20, 262	5, 506	17, 538	5, 501	16, 639	3, 228
July	19, 022	5, 214	13, 819	2, 471	17, 697	784	16, 035	2, 991	12, 626	982
August	25, 471	6, 917	18, 777	3, 937	19, 921	1, 152	21, 916	6, 879	24, 386	9, 371
September	27, 732	7, 264	22, 452	5, 622	16, 794	1, 975	23, 268	6, 768	28, 286	9, 346
October	18, 632	4, 397	48, 290	7, 349	27, 871	5, 472	30, 837	11, 657	31, 916	16, 721
November	19, 144	3, 697	24, 343	7, 417	18, 506	4, 566	30, 765	14, 229	40, 667	20, 488
December	15, 737	7, 029	25, 552	13, 376	17, 042	5, 794	46, 353	32, 182	54, 282	37, 579
Total	316, 053	135, 064	330, 211	145, 016	333, 234	115, 235	338, 655	180, 555	418, 948	240, 604

The greater increase in shipments marks a corresponding increase of the distributing trade. Receipts direct from Texas in double-decked cars are annually enlarging; this and other improvements in transportation secure the early delivery of animals in good condition. Prices did not show any great fluctuation. Common to choice sheep opened at $3 @ $5.75 and closed at $4 @ $5.25; reaching their maximum, $7.50, in April and May by gradual increase.

Sheep products—Wool.—The receipts of wool were 49,476,091 pounds against 36,267,191 in 1874, 34,486,858 in 1873, and 28,181,509 in 1872; shipments, 51,895,832 pounds against 38,117,931 in 1874, 32,715,453 in 1873, and 27,720,089 in 1872. The wool trade was dull and unsatisfactory, with prices lower than at any time since 1860. Prices of all sorts show a persistent gradual decline throughout the year; common to extra tub-washed from 48 @ 55 cents per pound to 40 @ 53; common to fine fleece-washed, 42 @ 48 to 38 @ 43; unwashed, 30 @ 35 to 25 @ 33 at the close of the year. The increased use of coarser grades of wool in the fashionable fabrics of the day, prepared by improved methods, caused a neglect of finer grades, though these showed some reaction during the last three months. During the first four months there was an active demand by western manufacturers. One Chicago firm imported 50,000 pounds from Boston to meet this demand. The increased quantity of trans-Mississippi wool annually marketed at Chicago marks the improvement in methods and breeds in New Mexico,

Colorado, California, and other wool-growing regions. The center of wool production is annually shifting westward, as is shown by the increasing proportion from the regions west of the Mississippi annually marketed at Chicago.

Swine.—The receipts of swine were 3,912,110, a loss of 346,269, or nearly 9 per cent.; the shipments amounted to 1,582,643, a decline of 744,718, or 32 per cent. The monthly receipts and shipments for five years were as follows:

Months.	1871.		1872.		1873.		1874.		1875.	
	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.	Receipts.	Shipments.
Jan	300, 697	26, 530	361, 935	78, 377	561, 245	95, 237	457, 088	146, 435	508, 347	135, 509
Feb	139, 342	47, 724	268, 236	104, 668	378, 760	163, 140	303, 341	163, 980	421, 833	127, 532
Mar	97, 058	75, 387	170, 785	144, 209	271, 626	224, 194	238, 728	202, 317	240, 797	147, 778
Apr	71, 632	63, 086	169, 149	145, 151	292, 903	225, 715	311, 945	245, 945	259, 569	171, 505
May	137, 521	111, 524	265, 259	196, 451	261, 361	217, 914	328, 838	265, 140	272, 887	164, 090
June....	197, 499	166, 513	254, 714	206, 940	245, 860	189, 586	310, 072	238, 396	299, 051	165, 184
July	165, 831	134, 391	212, 030	172, 934	244, 550	201, 682	231, 416	183, 450	290, 137	157, 781
Aug	118, 975	98, 187	219, 406	198, 077	234, 145	188, 776	205, 904	147, 355	190, 788	111, 378
Sept	164, 749	125, 561	214, 728	186, 010	239, 512	191, 241	261, 123	168, 628	165, 919	119, 181
Oct	161, 212	131, 370	229, 304	175, 241	325, 716	196, 569	350, 812	242, 350	301, 255	135, 073
Nov	386, 766	113, 643	373, 963	132, 381	616, 301	156, 926	727, 407	203, 437	491, 393	94, 428
Dec	456, 831	67, 490	513, 114	95, 195	665, 771	146, 577	531, 705	119, 928	470, 134	53, 204
Total .	2, 398, 113	1, 161, 406	3, 252, 623	1, 835, 634	4, 337, 750	2, 197, 557	4, 258, 379	2, 327, 361	3, 912, 110	1, 582, 643

The average weight of hogs received during the year was $233\frac{3}{4}$ pounds against 218 pounds in 1874. The monthly average weight per head during the last four years is given as follows:

Months.	1872.	1873.	1874.	1875.
January	$286\frac{5}{8}$	$289\frac{7}{8}$	$252\frac{3}{4}$	261
February	$263\frac{7}{8}$	$269\frac{7}{8}$	$211\frac{1}{4}$	251
March	$227\frac{3}{4}$	$221\frac{1}{2}$	$201\frac{1}{4}$	217
April	$225\frac{1}{8}$	213	$197\frac{3}{4}$	$206\frac{1}{2}$
May	223	$217\frac{3}{4}$	$199\frac{1}{4}$	210
June	$227\frac{1}{2}$	230	206. 7	218
July	234	$231\frac{3}{4}$	207. 9	223
August	$233\frac{1}{8}$	$235\frac{1}{2}$	$208\frac{1}{4}$	222
September	$257\frac{1}{8}$	241. 6	$209\frac{1}{8}$	230
October	$264\frac{1}{8}$	$252\frac{1}{4}$	$221\frac{3}{4}$	239
November	272	$267\frac{1}{4}$	244	$256\frac{1}{8}$
December	$283\frac{1}{4}$	$270\frac{1}{4}$	$253\frac{1}{2}$	275

An increasing number of hogs from Texas and the Indian Territory is annually marketed at Chicago. This branch of the trade has been greatly extended by increased facilities of transportation, and especially the use of double-deck cars.

Swine products.—The numbers of hogs packed at Chicago during the last six winter-seasons were as follows:

Seasons.	Number packed.	Average weight per head.	Average yield of lard per head.	Seasons.	Number packed.	Average weight per head.	Average yield of lard per head.
		Pounds.	*Pounds.*			*Pounds.*	*Pounds.*
1869–'70	688, 140	204. 75	30. 82	1872–'73	1, 456, 650	236, 25	44. 02
1870–'71	919, 197	225. 24	37. 13	1873–'74	1, 581, 650	216. 47	37. 44
1871–'72	1, 225, 236	232. 54	43. 07	1874–'75	1, 781, 896	212. 42	37. 30

Pork.—Receipts of 1875, 58,270 barrels; of 1874, 40,381; of 1873, 43,758; of 1872, 121,023; shipments of 1875, 311,170 barrels; of 1874, 233,764; of 1873, 191,144; of 1872, 208,664. The city product of the packing-season of 1874–'75 was 261,675 barrels; of 1873–'74, 195,917; of 1872–'73, 102,986; of 1871–'72, 152,012; of 1870–'71, 148,150; of 1869–'70, 118,599. Mess-pork opened at $18.75 @ $19 per barrel and closed at $18.80 @ $19.10; maximum, $22.75 @ $23.25, during the second week in October; minimum, $17.70 @ $18, in the middle of January; prices mostly above the range from the opening to the closing of the year.

Lard.—Receipts, 21,763,720 pounds against 21,896,420 in 1874, 26,574,425 in 1873, and 19,911,797 in 1872; shipments, 114,998,683 pounds against 81,893,387 in 1874, 89,847,680 in 1873, and 86,040,785 in 1872. The market was steady during the year, a formidable effort at "cornering" having failed, with considerable loss to its projectors. Steam-rendered lard opened at $13.15 @ $13.60 per cental and closed at $12.10 @ $12.20; maximum, $15.50 @ $15.75, in April; minimum at the close of the year.

Summary.—The annual receipts of cattle, sheep, and swine during ten years were as follows:

Years.	Cattle.	Sheep.	Swine.	Total.
1866	392, 604	209, 420	933, 233	1, 535, 257
1867	327, 650	180, 888	1, 606, 680	2, 115, 227
1868	324, 524	270, 875	1, 706, 782	2, 302, 181
1869	403, 102	340, 072	1, 661, 869	2, 405, 043
1870	532, 964	349, 855	1, 693, 158	2, 575, 977
1871	543, 050	316, 053	2, 398, 113	3, 240, 186
1872	684, 610	310, 211	2, 352, 623	4, 246, 909
1873	761, 428	333, 234	4, 337, 750	5, 390, 912
1874	843, 966	338, 645	4, 258, 379	5, 440, 990
1875	920, 843	418, 948	3, 912, 110	5, 251, 901

SAINT LOUIS.

Horses and mules.—The receipts of horses and mules in Saint Louis during 1875 amounted to 27,516 against 27,175 the previous year; the shipments amounted to 28,675 against 30,202 in 1874. The range of prices at the first of each month of the last three years was as follows:

Months.	1873.		1874.		1875.	
	Horses.	Mules.	Horses.	Mules.	Horses.	Mules.
January	....	....	$30 to $175	$60 to $200	$40 to $180	$75 to $200
February	....	....	30 to 165	50 to 200	40 to 180	75 to 200
March	$50 to $200	$85 to $200	30 to 165	50 to 250	40 to 180	75 to 200
April	50 to 200	85 to 200	30 to 165	50 to 200	40 to 180	75 to 200
May	40 to 200	85 to 175	30 to 165	50 to 200	40 to 180	75 to 180
June	40 to 225	85 to 200	40 to 170	65 to 200	40 to 180	75 to 200
July	40 to 225	85 to 200	40 to 200	70 to 190	40 to 180	75 to 180
August	40 to 230	90 to 225	40 to 200	75 to 200	40 to 180	75 to 200
September	40 to 225	90 to 225	40 to 180	75 to 200	40 to 180	75 to 200
October	40 to 225	75 to 225	40 to 170	75 to 200	40 to 200	85 to 200
November	25 to 175	65 to 175	40 to 170	75 to 200	25 to 200	80 to 200
December	40 to 200	65 to 225	40 to 170	75 to 200	20 to 200	80 to 200

The trade was mostly with the South, and not very remunerative.

Cattle.—The receipts of cattle during 1875 were 335,742 head, a decline of 7 per cent. from 1874; the shipments amounted to 125,679 head, an

increase of 9 per cent. The aggregate receipts and shipments of the last eleven years were as follows:

Years.	Receipts.	Shipments.	Year.	Receipts.	Shipments.	Year.	Receipts.	Shipments.
1865	94,307	52,133	1869	124,565	96,626	1873	279,678	86,434
1866	103,259	64,047	1870	201,422	94,477	1874	360,925	114,913
1867	74,146	62,974	1871	199,527	118,899	1875	335,742	125,679
1868	115,352	79,315	1872	263,404	115,904			

The following table shows the range of prices per cental at the beginning of each month of the last three years:

Months.	1871.	1872.	1873.	1874.	1875.
January	$2 50 to $6 25	$2 25 to $5 50	$1 50 to $6 00	$1 50 to $6 50	$2 00 to $6 00
February	2 50 to 6 50	3 25 to 5 75	1 50 to 6 00	1 50 to 6 25	2 00 to 6 00
March	2 75 to 6 50	3 50 to 6 75	1 50 to 6 37½	1 75 to 6 00	2 00 to 6 00
April	2 75 to 6 50	3 50 to 6 75	1 75 to 6 62½	2 00 to 6 25	1 75 to 6 25
May	2 62½ to 6 60	4 37½ to 6 50	2 00 to 6 12½	2 75 to 6 00	1 50 to 6 75
June	3 00 to 6 75	2 50 to 6 50	1 75 to 6 00	2 00 to 6 25	1 50 to 6 75
July	2 00 to 5 00	1 75 to 6 50	1 75 to 5 60	1 25 to 6 25	1 50 to 6 75
August	1 75 to 5 00	1 75 to 6 25	1 75 to 6 50	2 00 to 6 00	1 50 to 6 75
September	1 25 to 4 75	1 75 to 5 75	1 50 to 5 30	1 90 to 5 75	1 75 to 6 25
October	1 50 to 4 50	1 25 to 6 00	1 40 to 5 00	1 75 to 5 75	2 00 to 6 25
November	2 25 to 5 00	1 50 to 6 00	1 25 to 5 00	1 00 to 5 50	2 25 to 5 50
December	1 50 to 4 75	1 37½ to 5 75	1 25 to 5 00	1 75 to 5 75	2 25 to 6 12

The quality of the animals received was generally better than the previous year, especially Texas cattle; the demand was steady and active, shippers taking nearly two-thirds of the receipts.

Cattle products—Butter.—The receipts of butter embraced 110,074 packages against 74,937 in 1874, 64,607 in 1873, and 51,259 in 1872. It is a matter of special regret that no definite quantity is represented in these figures; the term packages being so indefinite as to have no statistical value whatever. The only general statement that may be made from these statistics is that the consumptive trade in butter is rapidly increasing. The shipments, not being of sufficient importance to note among the leading articles of export, indicate a very small distributive trade.

Cheese.—The receipts of cheese during 1875 amounted to 69,013 boxes against 80,579 in 1874, 58,790 in 1873, and 84,345 in 1872; the shipments by river and rail in 1875 amounted to 52,045 boxes. The range of prices of butter and cheese at the beginning of each month for the last five years was as follows:

Months.	1871.		1872.		1873.		1874.		1875.	
	Butter.	Cheese.	Butter.	Cheese.	Butter.	Cheese.	Butter.	Cheese.	Butter.	Cheese.
	Cents.	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*	*Cents.*
January	20 to 32	15½ to 16½	23 to 26	14½ to 15	20 to 28	14¾ to 15	25 to 32	13¾ to 14	25 to 33	13 to 13½
February	15 to 29	15½ to 24	19 to 33	14½ to 15	20 to 28	14½ to 15	27 to 37	15 to 16¼	23 to 33	13 to 13½
March	15 to 30	15 to 24	19 to 37	16½ to 17	20 to 32	15 to 16	27 to 37	15 to 16¼	23 to 33	13 to 13½
April	15 to 30	15½ to 23	20 to 40	18½ to 22	25 to 35	15 to 15¼	27 to 34	16 to 18½	18 to 33	13 to 13½
May	15 to 29	17 to 27	18 to 25	17 to 19	15 to 22	15 to 15¼	20 to 30	16 to 18½	15 to 28	13 to 13½
June	12 to 20	14½ to 16	16 to 20	13 to 13½	15 to 22	15 to 15¼	20 to 30	16 to 18½	15 to 28	13 to 13½
July	12 to 20	12 to 20	15 to 19	11½ to 12½	14 to 20	15 to 15¼	18 to 28	16 to 18½	14 to 28	13 to 13½
August	14 to 20	10½ to 12	16 to 24	10½ to 11	16 to 24	10½ to 11	20 to 28	16 to 18½	16 to 28	13 to 13½
September	14 to 21	9¾ to 10	16 to 30	12½ to 13½	19 to 27	13 to 14	20 to 28	16 to 18	18 to 28	13 to 13½
October	18 to 26	13½ to 14	20 to 33	14¼ to 15¼	20 to 30	13 to 14	25 to 35	13 to 14	20 to 28	10 to 13½
November	17 to 27	14 to 15¼	18 to 30	15½ to 16	18 to 32	13½ to 14½	26 to 36	13 to 13½	20 to 30	12½ to 14
December	14 to 20	14½ to 15	20 to 29	14¾ to 15	24 to 30	13¾ to 14	36 to 36	13 to 13½	20 to 30	13 to 14

The grades of butter in the above table were from good to choice; cheese quotations represent choice factory brands, either eastern or western.

Hides.—The trade in hides has assumed vast proportions, and is constantly growing. During 1875, the receipts amounted to 19,851,947 pounds, and the shipments to 32,457,805 pounds. The report of the Merchants' Exchange quotes with approbation the estimate of a leading dealer, that the receipts of 1875, from outside the city, embraced 700,000 pieces of dry and 500,000 pieces of green hides. The city butchers also marketed about 300,000 pieces, and the whole trade reached about $6,000,000 in value.

Sheep.—Receipts in 1875, 125,679, an increase of 9 per cent. compared with the previous year. The monthly receipts of 1875 were as follows: January, 6,194; February, 5,846; March, 5,781; April, 12,161; May, 9,642; June, 12,805; July, 10,566; August, 11,585; September, 19,872; October, 13,866; November, 10,090; December, 9,272. The annual receipts for the last eleven years were as follows: 1865, 52,133; 1866, 64,047; 1867, 62,974; 1868, 79,315; 1869, 96,326; 1870, 94,477; 1871, 118,899; 1872, 115,904; 1873, 86,370; 1874, 114,913; 1875, 125,679. The range of prices per cental on the first day of each month of the last three years will be found in the following table:

Months.	1873.	1874.	1875.
January	$4 60	$3 75 to $5 00	$2 25 to $4 75
February	3 00 to $5 25	.... 4 50	2 25 to 4 75
March	3 00 to 5 25	.... 5 00	2 50 to 5 00
April	3 00 to 6 00	2 50 to 5 60	4 00 to 6 25
May	3 50 to 6 75	4 25 to 6 10	3 75 to 6 25
June	3 00 to 6 50	4 00 to 6 00	3 75 to 6 25
July	2 50 to 4 25	2 50 to 6 00	3 75 to 6 25
August	.... 4 25	2 50 to 6 00	3 75 to 6 25
September	3 20 to 3 50	2 00 to 4 25	2 85 to 4 25
October	2 90 to 4 12½	2 25 to 4 25	2 85 to 4 25
November	3 00 to 3 62½	2 50 to 5 25	3 00 to 4 75
December	1 75 to 4 25	2 25 to 4 75	2 75 to 4 90

Sheep-products—Wool.—The receipts of wool during 1875 amounted to 4,249,307 pounds against 4,963,417 pounds in 1874 and 3,956,212 in 1873; the shipments amounted to 3,756,518 pounds. The depression in woolen fabrics kept down prices, and crippled the wool trade during the whole year.

Swine.—The receipts of live hogs during 1875 amounted to 628,569, a decline of 44 per cent. from the previous year; the shipments were 126,729, a loss of 70 per cent. The receipts of the last eleven years were as follows: 1865, 52,133; 1866, 64,047; 1867, 62,794; 1868, 79,315; 1869, 96,626; 1870, 94,477; 1871, 118,899; 1872, 115,904; 1873, 86,434; 1874, 114,913; 1875, 125,679. The shipments of the same years were as follows: 1865, 17,869; 1866, 13,368; 1867, 28,627; 1868, 16,277; 1869, 39,076; 1870, 17,156; 1871, 113,913; 1872, 188,700; 1873, 224,873; 1874, 453,710; 1875, 126,729. The shortened supply is attributed to the failure of the corn-crop through large regions dependent upon the Saint Louis market. This caused packers to buy slaughtered hogs in other markets for packing at home. The range of prices at the beginning of each month of the last three years was as follows:

Months.	1873.	1874.	1875.
January	$3 30 to $3 70	$2 81 to $5 37½	$4 00 to $6 90
February	3 85 to 4 25	4 90 to 5 65	4 50 to 7 00
March	4 25 to 5 00	4 90 to 5 30	5 00 to 7 25
April	4 60 to 5 50	5 00 to 5 25	5 00 to 7 25
May	4 95 to 5 35	4 50 to 5 45	.... 8 00
June	4 35 to 4 60	4 80 to 5 00	6 60 to 8 00
July	3 90 to 4 25	5 00 to 6 00	6 60 to 8 00
August	4 00 to 4 40	5 50 to 7 25	6 60 to 8 00
September	4 00 to 4 50	4 00 to 7 50	6 00 to 8 00
October	.... 4 00	4 50 to 7 25	6 00 to 8 00
November	3 70 to 4 25	3 25 to 6 25	5 25 to 7 25
December	4 00 to 4 25	5 50 to 7 50	6 90 to 7 00

Swine-products.—The receipts of barreled pork during 1875 amounted to 46,547 barrels, a decline of 16 per cent. from 1874. This branch of trade shows a steady decline since 1871. The shipments amounted to 95,503 barrels. Of bacon and cut meats, the receipts amounted to 51,556,146 pounds, a decline of 548,234 pounds; the shipments amounted to 105,809,598 pounds against 133,486,380 in 1574. Of lard, the receipts from outside the city were 6,732,320 pounds, against 6,877,560 in 1874, 8,981,820 in 1873, and 11,288,890 in 1872; the shipments of 1875 were 24,145,176 pounds; of 1874, 27,112,270; of 1873, 37,156,810 pounds; of 1872, 33,943,860.

The number of hogs winter-packed during the last fourteen seasons, with their average weight and yield of lard per head, were as follows:

Years.	Number of hogs packed.	Average weight.	Average yield of lard.	Years.	Number of hogs packed.	Average weight.	Average yield of lard.
		Pounds.	*Pounds.*			*Pounds.*	*Pounds.*
1861–'62	89,093	224.50 net	....	1868–'69	231,937	189.27 net	....
1862–'63	178,750	207.00 net	....	1869–'70	241,316	190.50 net	....
1863–'64	244,600	179.00 net	....	1870–'71	305,600	216.00 net	....
1864–'65	191,890	178.50 net	....	1871–'72	419,032	263.15 gross	35.17
1865–'66	123,335	208.91 net	....	1872–'73	538,000	260.00 gross	34.50
1866–'67	183,543	222.34 net	....	1873–'74	463,793	261.53 gross	34.18
1867–'68	237,160	193.91 net	....	1874–'75	462,246	240.00 gross	30.00

During the summer packing-season, from March 1 to November 1, 1875, there were packed 102,424 hogs, averaging 220 pounds per head gross; the summer-packing of 1874 embraced 159,962 hogs, averaging 209 pounds gross; 1873, 132,155 hogs, averaging 244.26 pounds gross; 1872, 98,720 hogs, averaging 233.63 pounds gross. In 1875, the city packers, employing a capital of $7,000,000, produced pork, bacon, and lard reaching in value $11,000,000. They control an amount of packing at points around the city embracing more than double the number of hogs packed in their city warehouses. It is estimated that the entire number of hogs cut by Saint Louis packers will fall little, if any, short of a million. About half of this outside product is shipped to the city, the remainder being shipped directly to eastern markets.

PORK-PACKING.

PORK-PACKING IN THE WEST.

Winter-packing.—From the record kept by the Cincinnati Price-Current, it appears that the annual numbers of hogs packed in the West during the last twenty-seven seasons were as follows: 1849–'50, 1,652,220; 1850–'51, 1,332,867; 1851–'52, 1,182,846; 1852–'53, 2,201,110; 1853–'54, 2,534,770; 1854–'55, 2,124,404; 1855–'56, 2,489,502; 1856–'57, 1,818,486; 1857–'58, 2,210,778; 1858–'59, 2,465,552; 1859–'60, 2,350,822; 1860–'61, 2,155,702; 1861–'62, 2,893,666; 1862–'63, 4,069,520; 1863–'64, 3,261,105; 1864–'65, 2,422,779; 1865–'66, 1,785,955; 1866–'67, 2,490,791; 1867–'68, 2,781,084; 1868–'69, 2,499,873; 1869–'70, 2,635,312; 1870–'71, 3,695,251; 1871–'72, 4,831,558; 1872–'73, 5,400,394; 1873–'74, 5,466,380; 1874–'75, 5,566,226; 1875–'76, 4,880,185.

The following table shows the number packed in the different States of the West and Northwest during the last four packing-seasons:

States.	1872–'73.	1873–'74.	1874–'75.	1875–'76.
Ohio	885, 827	906, 804	870, 971	819, 602
Indiana	610, 966	715, 703	666, 575	575, 433
Illinois	1, 834, 611	1, 887, 328	2, 113, 845	1, 915, 830
Iowa	325, 417	369, 278	426, 258	361, 746
Missouri	894, 334	746, 366	707, 310	556, 143
Kansas	40, 885	64, 037	49, 536	30, 725
Wisconsin	324, 072	333, 514	269, 468	217, 426
Minnesota	24, 550	32, 700	20, 950	18, 750
Nebraska	20, 220	29, 085	26, 950	26, 190
Kentucky	322, 456	257, 259	308, 068	263, 748
Tennessee	39, 300	26, 577	22, 639	22, 818
Michigan	49, 306	71, 549	62, 836	53, 837
Miscellaneous*	28, 450	26, 000	20, 820	17, 887
Total	5, 400, 394	5, 466, 200	5, 566, 226	4, 880, 135
Increase	....	65, 806	100, 026	....
Decrease	....	....	....	686, 091

* Including Pittsburgh and a few points in the Southern States.

The average net weight per head, the average yield of lard per head, and average cost per cental during the last four packing-seasons were as follows:

States.	Average net weight per head.				Average yield of lard per head.				Average cost per cental.			
	1872–'73.	1873–'74.	1874–'75.	1875–'76.	1872–'73.	1873–'74.	1874–'75.	1875–'76.	1872–'73.	1873–'74.	1874–'75.	1875–'76.
	Lbs.	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*				
Ohio	242. 51	233. 49	222. 73	215. 14	43. 85	39. 04	39. 66	36. 07	$4 82. 59	$5 57. 24	$8 64. 30	$8 64
Indiana	230. 25	207. 22	208. 80	210. 41	33. 89	29. 66	29. 83	32. 66	4 43. 96	5 29. 63	8 14. 96	8 81
Illinois	239. 21	219. 02	213. 76	231. 46	43. 21	37. 23	36. 66	36. 85	4 67. 10	5 43. 25	8 35. 60	8 93
Iowa	229. 55	204. 67	198. 67	215. 81	37. 44	33. 88	33. 52	34. 10	4 31. 29	5 19. 03	7 87. 58	8 24
Missouri	214. 12	207. 01	189. 74	215. 85	36. 03	33. 86	29. 19	36. 82	4 63. 30	5 36. 63	8 19. 10	8 70
Kansas	244. 18	220. 64	171. 63	232. 03	37. 50	35. 83	25. 43	37. 70	4 01. 10	4 77. 58	7 59. 00	7 66
Wisconsin	230. 45	210. 89	212. 48	215. 80	39. 55	30. 50	31. 63	31. 00	4 72. 48	5 72. 16	8 56. 04	8 76
Minnesota	227. 27	229. 36	237. 46	248. 63	39. 36	36. 41	29. 83	30. 60	4 81. 00	5 68. 52	7 28. 90	7 72
Nebraska	246. 71	214. 65	193. 36	218. 57	39. 70	34. 59	26. 88	39. 01	3 70. 00	4 64. 17	7 22. 00	7 79
Kentucky	225. 84	213. 87	209. 60	215. 92	39. 78	29. 66	29. 79	32. 67	4 88. 00	5 44. 45	8 67. 51	9 05
Tennessee	207. 11	200. 42	192. 39	214. 81	31. 21	34. 16	29. 20	31. 87	5 13. 50	5 72. 23	8 81. 00	8 29
Michigan	237. 94	234. 02	234. 27	229. 70	38. 95	38. 26	35. 15	33. 66	4 94. 20	5 54. 30	8 15. 88	8 66
Miscellaneous*	237. 94	207. 94	197. 08	220. 92	38. 95	31. 03	28. 27	33. 12	4 94. 20	5 88. 10	8 64. 00	8 92
General average	232. 43	214. 97	209. 77	217. 71	40. 08	35. 02	34. 20	35. 45	4 65. 80	5 43. 15	8 33. 63	8 82

* Including Pittsburgh, Pa., and a few points in the Southern States.

The aggregate net weight, yield of lard, and cost per cental during the last four packing-seasons were as follows:

	1872–'73.	1873–'74.		1874–'75.		1875–'76.	
	Aggregate.	Aggregate.	Decrease	Aggregate.	Decrease.	Aggregate.	Decrease.
Net weight...pounds.	1,257,519,283	1,175,126,971	82,392,312	1,167,639,457	7,487,514	1,062,456,021	105,183,436
Yield of lard ....do...	216,845,385	191,444,035	25,401,350	190,380,607	1,063,428	173,016,580	17,364,027
			Increase,		*Increase,*		*Decrease,*
Cost................	$58,375,148	$63,827,021	$5,451,873	$97,338,826	$33,511,805	$93,692,382	$3,646,444

The operations of the packing-season lately closed show a decrease of 12$\frac{1}{3}$ per cent. in the number of hogs packed, 9 per cent. in the aggregate weight, 9 per cent. in the aggregate lard product, and 3.7 per cent. in the aggregate amount paid by packers. The increase in the average weight per head increased 3$\frac{3}{4}$ per cent., the average yield of lard 3$\frac{2}{3}$ per cent., and the average cost per cental nearly 6 per cent.; yet the great decline in the number of hogs packed has depressed the aggregate product and its value. It is remarkable that the aggregate weight and lard product have uniformly declined since the season of 1872–'73, when the average weight and lard product per head were at their maximum; but in both these items the season just closed shows an improvement compared with that of two years previous. During the last season, Minnesota reports the largest average net weight per head, 248.63 pounds, and Nebraska the largest lard product per head, 39.01 pounds. The highest average price per cental, $9.05, was paid in Kentucky, and the lowest, $7.66, in Kansas. The high prices caused every marketable hog to be brought forward, and will reduce the stock hogs of the country. But for this stimulus the reduction in the number packed would have been still greater. The average weight was reduced by the large number of light hogs marketed during the closing period of the season. The returns embrace 61 new points, at which 51,095 hogs were packed. These, not making any figure in the reports of the previous year, indicate a still greater reduction in the aggregate pork product of the West than is shown by the figures. The high prices also reduced the number packed by the farmers, who were particularly anxious to realize every dollar possible. The great decline in the pork product of the season lately closed is attributed by intelligent operators in part to the increased ravages of disease; but no reliable statistics show a loss from this cause sufficient to account for the very great decline in the last season's pork product, amounting to 15$\frac{1}{2}$ per cent. in the aggregate weight of hogs packed compared with the season of 1872–'73, and nearly 10 per cent. in the aggregate number.

As a result of the operations of the last winter packing-season, a scarcity of hogs for summer operations was anticipated; but in many localities an increase in the number of breeding-sows was reported. Stock hogs in the spring of 1876 brought exceptionally high prices in different parts of the West. But while a decreased summer-packing may be expected in 1876, the scarcity of hogs and high prices cannot fail to greatly stimulate swine-raising in the future.

The average and aggregate weights and lard products of the last eleven packing-seasons were as follows:

Seasons.	Net weight per head.	Aggregate weight of hogs packed.	Average yield of lard per head.	Aggregate yield of lard.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1865–'66	231.30	413,091,391	41.52	74,152,851
1866–'67	232.14	588,212,222	39.66	98,801,376
1867–'68	201.00	558,997,884	29.00	80,651,436
1868–'69	206.75	516,848,742	32.33	80,829,227
1869–'70	205.75	542,215,444	31.84	83,908,334
1870–'71	230.14	850,425,065	40.19	148,512,317
1871–'72	227.62	1,099,783,385	38.54	188,603,317
1872–'73	232.43	1,257,519,283	40.08	216,845,385
1873–'74	214.97	1,175,126,971	35.02	191,444,035
1874–'75	209.77	1,167,639,457	34.20	190,380,607
1875–'76	217.71	1,062,456,021	35.45	173,016,580

PACKING OF THE SIX PRINCIPAL WESTERN CITIES.

The number of hogs packed during the last four winter packing-seasons at six leading points in the West, compared with the whole, were as follows:

Packing-points.	1872–'73.	1873–'74.	1874–'75.	1875–'76.
Chicago	1,425,079	1,520,204	1,690,348	1,592,065
Cincinnati	626,305	581,253	560,164	563,359
Saint Louis	538,000	463,793	402,246	329,895
Indianapolis	196,317	295,766	278,339	323,184
Milwaukee	303,500	294,054	236,596	223,147
Louisville	302,246	226,947	273,118	181,972
Total for the six cities	3,391,447	3,382,017	3,500,811	3,213,622
Other points	2,008,947	2,084,183	2,065,415	1,666,513
Grand total	5,400,394	5,466,200	5,566,226	4,880,135
Per cent. of the six cities	62.68	61.87	62.89	65.81

Cincinnati is the only point that packed a larger number of hogs during the season lately closed than the previous one; but the aggregate of the six cities bears a larger proportion to the whole than in any previous year. The average net weight and lard product per head during the last two seasons at these six cities were as follows:

Packing-points.	Average weight per head.		Average yield of lard per head.	
	1874–'75.	1875–'76.	1874–'75.	1875–'76.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
Chicago	212.42	217.32	37.30	36.32
Cincinnati	220.60	218.95	41.77	37.80
Saint Louis	192.00	214.78	30.00	36.56
Indianapolis	196.00	201.00	29.50	31.00
Milwaukee	209.27	215.15	29.87	32.40
Louisville	208.56	209.83	31.15	30.63
At the six cities	209.47	215.13	35.43	35.47
At other points	210.27	222.69	32.21	35.41
At all points	209.77	217.71	34.20	35.45

The product of barreled pork at these six cities during the last two winter packing-seasons was as follows:

Packing-points.	1874-'75.		1875-'76.	
	Mess.	Other.	Mess.	Other.
	Barrels.	*Barrels.*	*Barrels.*	*Barrels.*
Chicago	216, 515	45, 160	200, 821	35, 609
Cincinnati	38, 262	6, 240	36, 735	6, 994
Saint Louis	30, 000	7, 000	27, 022	5, 777
Indianapolis	None ...	2, 500	None ...	None.
Louisville	17, 378	1, 555	15, 089	856
Milwaukee	25, 950	21, 187	19, 794	13, 378
At the six points	328, 125	83, 642	299, 461	62, 614
Total product	452, 731	116, 737	397, 304	110, 826

Summer-packing.—The number of hogs packed in the West from March 1 to November 1, 1874 and 1875, was as follows:

Packing-points.	1874.	1875.
Chicago	446, 368	728, 781
Cincinnati	136, 153	118, 783
Saint Louis	150, 962	102, 424
Indianapolis	204, 426	89, 162
Milwaukee	12, 600	2, 632
Total for five cities	950, 509	1, 041, 782
Cleveland, Ohio	117, 136	106, 304
Canton, Ill	73, 839	72, 133
Charleston, Ill	17, 000	7, 000
Kansas City, Mo	10, 000	....
Detroit, Mich	10, 000	9, 000
Other points	12, 900	16, 404
	1, 200, 404	1, 262, 343
Average weight per head ...pounds..	164	177. 32
Aggregate net weight ...do....	196, 872, 810	223, 845, 720
Increase in number	....	61, 889
Increase in weight ...pounds..	....	26, 972, 910

Summer and winter packing.—The results of the operations of two years, ending March 1, 1876, were as follows:

	Number of hogs packed.		Weight of hogs packed.	
	1874-'75.	1875-'76.	1874-'75.	1875-'76.
			Pounds.	*Pounds.*
Summer-packing	1, 200, 444	1, 262, 343	196, 872, 810	223, 845, 720
Winter-packing	5, 566, 226	4, 880, 135	1, 167, 639, 457	1, 062, 456, 021
Total	6, 766, 670	6, 142, 478	1, 364, 512, 267	1, 286, 301, 741
Decrease	....	624, 192	....	78, 210, 526
Average net weight per head	....	....	201. 65	209. 41

PORK-PACKING IN THE EAST.

The amount of regular packing in the seaboard cities is so small that no attempt has been made in those cities to collect regular statistics.

The business has never been organized, for the reason that the facilities afforded in the East are not such as to enable packers to compete with the West. Some fancy brands of barreled pork and bacon are produced, but only to meet a very limited and fastidious demand. It is estimated that not over 7,000 hogs were cut at Philadelphia during the winter packing-season lately closed, or about one-fourth of the number of the preceding season. Hogs were too scarce and prices too high to invite enterprise of this character. The business is on a small scale also at New York, Boston, and Baltimore. The number of hogs received at these four cities during the last two winter packing-seasons was as follows:

Cities.	1874-'75.	1875-'76.	Increase.	Decrease.
Boston	248,949	161,412	....	87,537
New York	687,425	490,901	....	196,524
Philadelphia	117,260	120,750	3,490	....
Baltimore	112,500	94,328	....	18,172
Total	1,166,134	867,391	....	....
Net decrease	....	298,743	....	....

In the above figures, the receipts at Baltimore include only live hogs, and at the other cities slaughtered hogs.

The receipts for the last two calendar years were as follows:

Cities.	1874.	1875.	Decrease.
Boston	613,874	416,657	197,217
New York	1,877,419	1,443,167	434,252
Philadelphia	419,934	325,677	94,257
Baltimore	357,547	279,631	77,916
Total	3,268,774	2,465,132	803,642

At Albany, N. Y., 44,238 hogs were packed during the last winter packing-season, a decline of 10,077 compared with the previous season. At Troy, 22,500 hogs were packed against 25,000 the previous season. At Albany, 8,324 hogs were packed during the summer of 1875. At Buffalo, during the last winter packing-season, the excess of receipts over shipments was 82,300, or 30,000 greater than during the previous season. The movement of hogs here is mostly by through-shipment, and the aggregates reported are based upon a rough estimate of 100 head per car. The excess of receipts in the calendar year 1875 was 159,500; in 1874, 173,200; in 1873, 207,400; in 1872, 264,500; in 1871, 80,500. At Pittsburgh, Pa., during four months ending March 1, 1876, there were received at the East Liberty stock-yards 268,425 hogs, averaging 220.77 pounds per head, gross; during the same months of 1874-'75, the receipts amounted to 274,094 head, averaging 220.74 pounds. These hogs were mostly shipped eastward.

PORK-PACKING ON THE PACIFIC SLOPE.

At San Francisco, Cal., about 90,000 hogs were packed during 1875 against 230,000 in 1874. At Eureka, Humboldt County, 10,000 were packed; at Nevada City, Placer County, 8,000; at other points, about

62,000, making a total of about 170,000, against 390,000 in 1874, a falling-off of 220,000. The California hogs are light; the average weight per head at San Francisco being 124 pounds net in 1875 against 115 pounds in 1874. A packer in Oregon estimates the number packed in that State at 20,000; but other estimates greatly exceed this number. Oregon hogs are generally much heavier than those packed at San Francisco.

AGRICULTURAL EXPORTS.

Statement of the exports of agricultural products of the United States, with their immediate manufactures, for the two fiscal years ending June 30, 1874, and June 30, 1875, compiled from the reports of the Bureau of Statistics of the Treasury.

Products.	1874.		1875.	
	Quantity.	Value.	Quantity.	Value.
Animals, living:				
Hogs ... number..	158, 581	$1, 625, 837	64, 979	$739, 215
Horned cattle ... do....	56, 067	1, 150, 857	57, 211	1, 103, 085
Horses ... do....	1, 432	169, 303	3, 166	239, 156
Mules ... do....	1, 252	174, 125	2, 776	356, 098
Sheep ... do....	124, 248	159, 735	124, 416	183, 898
All other, and fowls ... do....	...	30, 531	...	47, 448
Animal matter:				
Bone-black, ivory-black, &c ... pounds..	903, 823	58, 121	1, 598, 888	74, 648
Bones and bone-dust ... cwt..	47, 868	108, 440	71, 376	132, 246
Candles ... pounds..	1, 995, 092	302, 277	1, 605, 332	236, 676
Furs and fur-skins ...	...	3, 334, 365	...	4, 396, 424
Glue ... pounds..	71, 564	12, 939	131, 244	22, 745
Hair, unmanufactured ...	...	394, 056	...	429, 598
manufactures of ...	...	33, 257	...	19, 278
Hides and skins other than fur ...	...	2, 560, 382	...	4, 729, 725
Leather and its manufactures:				
Morocco and other fine ...	...	232, 884	...	335, 086
Kinds not specified ... pounds..	15, 628, 285	3, 940, 450	24, 154, 193	6, 286, 397
Boots and shoes ... pairs..	243, 500	383, 417	293, 039	429, 275
Saddlery and harness ...	...	98, 132	...	73, 612
Other manufactures ...	...	131, 635	...	199, 743
Oil, lard ... gallons..	252, 577	203, 317	146, 594	147, 384
other animal ... do....	17, 090	17, 285	12, 136	12, 515
Provisions:				
Bacon and hams ... pounds..	347, 405, 405	33, 383, 908	250, 280, 950	28, 611, 930
Beef ... do....	36, 036, 537	2, 956, 676	48, 243, 251	4, 197, 956
Butter ... do....	4, 367, 983	1, 092, 381	6, 360, 653	1, 506, 764
Cheese ... do....	90, 611, 077	11, 898, 995	101, 010, 553	13, 659, 561
Condensed milk ...	...	79, 018	...	123, 565
Eggs ... dozen..	23, 749	5, 239	34, 119	8, 743
Lard ... pounds..	205, 527, 471	19, 308, 019	166, 859, 213	22, 900, 486
Pork ... do....	70, 482, 379	5, 808, 712	56, 152, 241	5, 671, 495
Preserved meats ...	...	848, 246	...	735, 112
Soaps, perfumed and toilet ...	...	8, 460	...	16, 233
all other ... pounds..	9, 345, 358	651, 282	10, 166, 560	677, 159
Tallow ... do....	101, 755, 631	8, 135, 320	65, 461, 619	5, 692, 203
Wax ... do....	342, 068	113, 800	353, 425	96, 958
Wool, raw and fleece ... do....	319, 600	72, 169	178, 034	62, 754
manufactures of ... do....	...	124, 099	...	152, 514
Total value of animals and animal matter	...	99, 607, 669	...	104, 307, 685
Breadstuffs and their preparations:				
Barley ... bushels..	320, 399	210, 738	91, 078	61, 347
Bread and biscuit ... pounds..	11, 142, 439	676, 197	11, 729, 458	610, 092
Corn ... bushels..	34, 434, 606	24, 769, 951	28, 858, 420	24, 456, 937
Corn-meal ... barrels..	387, 807	1, 529, 399	291, 654	1, 290, 533
Oats ... bushels..	812, 873	383, 762	504, 770	290, 537
Rye ... do....	1, 564, 484	1, 568, 362	207, 100	204, 590
Rye-flour ... barrels..	59, 820	388, 313	9, 993	54, 964
Wheat ... bushels..	71, 039, 928	101, 421, 459	53, 047, 175	59, 607, 863
Wheat-flour ... barrels..	4, 094, 094	29, 258, 094	3, 951, 086	23, 710, 074
Other small grains and pulse ...	...	670, 146	...	804, 214
Other preparations of breadstuffs for food.	...	322, 443	...	364, 153
Rice ... pounds..	558, 922	27, 075	276, 844	19, 806
Total value of breadstuffs, &c ...	...	161, 225, 939	...	111, 475, 110
Cotton and its manufactures:				
Sea-island ... pounds..	6, 426, 524	2, 114, 124	4, 429, 120	1, 538, 769
Other, unmanufactured ... do....	1, 352, 175, 779	209, 109, 456	1, 255, 979, 783	189, 099, 856

Statement of the exports of agricultural products of the United States, &c.—Continued.

Products.	1874.		1875.	
	Quantity.	Value.	Quantity.	Value.
Cotton and its manufactures—Continued.				
Colored goods .... yards..	4,625,180	668,781	7,593,723	939,061
Uncolored goods .... do....	13,247,142	1,681,209	21,224,020	2,313,270
All other		745,850		819,445
Total value of cotton, &c		214,319,420		194,710,401
Wood and its products:				
Boards, planks, joists, &c .... M feet..	288,481	4,242,389	213,874	3,694,909
Laths, palings, pickets, &c ... thousands..	5,386	22,382	6,777	22,535
Shingles .... do....	28,316	106,291	40,628	160,925
Box-shooks		63,856		471,942
Other staves and headings		6,456,391		5,239,329
Hogsheads and barrels, empty .. number..	170,348	335,777	202,879	459,085
All other lumber		164,131		235,984
Firewood .... cords..	2,721	9,279	1,973	8,023
Hop, hoop, and telegraph poles		1,028,584		556,450
Logs, masts, and other whole timber		641,361		572,801
Timber, sawn or hewn .... cubic feet..	25,209,048	4,422,160	13,553,714	2,357,842
All other timber		205,943		366,975
Household-furniture		1,882,767		1,711,769
Wooden ware		240,350		342,815
Other manufactures		1,532,060		1,539,810
Ashes, pot and pearl .... pounds..	1,502,626	116,766	1,726,624	115,622
Bark for tanning		160,670		193,938
Rosin and turpentine .... barrels..	929,342	3,046,431	937,522	2,774,419
Spirits of turpentine .... gallons..	6,784,173	2,758,933	5,599,734	1,924,544
Tar and pitch .... barrels..	71,920	238,779	54,905	127,206
Total value of wood, &c		27,675,300		22,876,923
Miscellaneous vegetable matter:				
Brooms, brushes, &c		127,593		146,988
Cordage, ropes, &c .... pounds..	1,604,332	242,923	3,035,241	391,165
Fruits, apples, green, ripe, or dried		499,205		1,048,136
other, green, ripe, or dried		211,308		269,534
preserved, in cans, &c		283,649		315,850
Ginseng .... pounds..	400,619	448,760	497,487	658,926
Hay .... tons..	4,889	111,872	7,183	110,225
Hemp, unmanufactured .... cwt..	1,106	8,901	2,140	21,856
cordage, cables, &c .... do...	16,239	272,612	11,133	171,196
other manufactures		861,746		706,269
Hops .... pounds..	117,358	27,973	3,066,695	1,286,497
Liquors, alcoholic:				
Beer, ale, porter, cider, in bottles. doz..	2,897	6,245	3,633	7,600
in casks. galls..	99,135	33,357	61,661	16,604
Spirits distilled from grain ..... do...	1,893,800	982,287	129,977	113,112
molasses .. do...	451,117	168,510	414,564	210,169
other materials, gallons.......	20,548	13,819	211	634
Wine .... gallons..	48,141	45,534	44,978	50,305
Oil-cake .... pounds..	215,336,380	4,099,360	247,046,095	5,138,300
Oil, vegetable:				
Cotton-seed .... gallons..	782,067	372,327	417,387	216,640
Linseed .... do....	22,047	22,692	32,370	30,689
Essential or volatile		151,430		217,576
Seeds, cotton .... pounds..	6,303,985	63,557	3,316,113	63,128
flax or lint .... do....	286	900	43	137
all other .... do....		674,457		1,227,750
Starch .... do....	7,435,064	420,809	7,387,362	442,682
Sugar, brown .... do....	163,090	16,172	362,312	31,093
refined .... do....	9,969,821	1,041,162	23,789,836	2,585,382
molasses .... gallons..	2,447,905	569,972	3,575,975	1,135,992
candy and confectionery		30,593		41,029
Tobacco and its manufactures:				
Leaf .... pounds..	318,097,804	30,399,181	223,901,993	25,241,549
Cigars .... thousands..	2,458	24,473	336	17,072
Snuff .... pounds..	15,716	7,092	21,894	7,570
Other manufactures		2,537,782		2,578,279
Vegetables and their preparations:				
Onions .... bushels..	34,105	52,057	47,695	51,259
Pickles and sauces		20,784		18,860
Potatoes .... bushels..	497,413	471,332	522,144	609,612
All other		156,078		169,419
Vinegar .... gallons..	25,348	8,122	16,345	4,756
Total value of miscellaneous		45,486,626		45,353,840

RECAPITULATION.

	1871.	1872.	1873.	1874.	1875.
	Value.	*Value.*	*Value.*	*Value.*	*Value.*
Animals and animal matter	$47, 010, 312	$77, 060, 849	$99, 964, 943	$99, 607, 669	$104, 307, 685
Breadstuffs, &c	79, 519, 387	85, 155, 523	99, 090, 831	161, 225, 939	111, 475, 110
Cotton, &c	221, 885, 245	182, 988, 925	230, 190, 597	214, 319, 420	194, 710, 401
Wood, &c	15, 820, 029	21, 425, 068	25, 854, 120	27, 675, 300	22, 876, 923
Miscellaneous	33, 069, 081	40, 139, 296	37, 660, 376	45, 486, 626	45, 353, 840
Total agricultural exports	397, 304, 054	406, 769, 661	492, 760, 867	548, 314, 954	478, 723, 959
Total domestic exports	562, 518, 651	549, 219, 718	649, 132, 563	693, 039, 066	643, 094, 767
Per cent. of agricultural exports	70	74	76	79	74

Fifty years ago, or from 1825 to 1830, the annual average of our agricultural exports was $50,571,390. In 1874 they aggregated $548,314,954, or 79 per cent. of all our exports. This was an increase of a fraction less than tenfold. Cotton was then 55 per cent. of the whole; in 1874 but 39 per cent., other agricultural exports being now equivalent to nearly two-thirds of the total, instead of less than half. The exports of breadstuffs in 1874 were worth about six times as much as those of cotton a half century ago. The exports of forest products now are almost exactly the same as the cotton exports then; yet that valuable staple, though constantly diminishing in relative importance, has enlarged its foreign supply more than sixfold during this period.

Taking periods of five years each, there is found an increase in each successive period, except in that ending in 1845, when there was a decrease of nearly 10 per cent., following the great financial depression which convulsed and nearly overwhelmed all industries; and in one other, the war period ending in 1865, when there was a decrease of 27 per cent. The largest percentage of increase, 88 per cent., was in the period subsequent to the war, and the record of other periods is as follows: That ending in 1835, 36 per cent.; 38 in 1840; 38 again in 1850; 40 in 1855; 53 in 1860, and 32 in 1875.

Taken in proportion to population, it is gratifying to note an increase in value of agricultural exports per capita, interrupted only in the two periods named, the value per head being respectively, in successive periods, $4.22, $4.99, $5.97, $4.66, $5.52, $6.66, $8.79, $5.63, $9.57.

MARKET PRICES OF FARM

The following quotations represent the state of the market

Products.	January.	February.	March.	April.	May.
NEW YORK.					
Flour, superfine, State and western .....bbl..	$4 00 to $4 50	$3 90 to $4 30	$4 25 to $4 75	$4 40 to $4 70	$4 60 to $4 90
extra State .....do..	4 80 to 5 65	4 75 to 5 30	4 80 to 5 25	4 85 to 5 40	5 05 to 5 50
extra to choice western .....bbl..	4 75 to 8 00	4 65 to 8 00	4 80 to 8 00	4 95 to 5 60	5 05 to 8 25
common to fair south'n extras.bl..	4 90 to 5 85	4 75 to 5 50	4 80 to 5 50	4 95 to 5 60	5 10 to 5 75
good to choice southern extras.......bl..	5 90 to 8 25	5 65 to 8 00	5 55 to 8 00	5 65 to 8 00	5 20 to 8 25
Wheat, No. 1 spring..bush.	1 20 to 1 25	1 18 to 1 25	1 16 to 1 19	1 22 to 1 28	1 27 to 1 31
No. 2 spring ...do..	1 11 to 1 17	1 09 to 1 12	1 09 to 1 14½	1 16 to 1 20	1 19 to 1 23
winter, red, and western ...bush.	1 20 to 1 32	1 20 to 1 27½	1 22 to 1 27	1 25 to 1 29	1 33 to 1 42
winter, amber, and western ...bush	1 20 to 1 32	1 25 to 1 28	1 22 to 1 27	1 25 to 1 29	1 33 to 1 42
winter, white, and western ...bush.	1 30 to 1 37	1 27 to 1 32	1 25 to 1 34	1 29 to 1 34	1 40 to 1 45
Rye ....do..	92 to 95	91 to 96	84 to 94	90 to 1 00	95..........
Barley ....do..	1 40 to 1 60	Nominal.....	1 05 to 1 30	1 20 to 1 22	1 28 to 1 45
Corn ....do..	86 to 97	83 to 84½	80 to 84½	85 to 87	91 to 93½
Oats ....do..	66 to 73	65 to 70	65 to 70	68 to 74	73½ to 78½
Hay, first quality .....ton	14 00 to 19 00	15 00 to 20 00	15 00 to 20 00	18 00 to 23 00	17 00 to 20 00
second quality...do..	13 00 to 14 00	13 00 to 14 00	13 00 to 15 00	14 00 to 16 00	12 00 to 13 00
Beef, mess ....bbl..	9 50 to 10 50	9 50 to 10 50	9 50 to 10 50	9 50 to 10 50	9 50 to 10 50
extra mess ......do..	11 00 to 12 50	10 50 to 12 00	10 50 to 12 00	10 50 to 12 00	10 50 to 12 00
Pork, mess ....do..	19 75 to 20 50	.........19 75	19 75..........	21 75..........	22 25..........
extra prime.....do..	17 00..........	15 00 to 15 50	14 50 to 15 00	16 25 to 16 50	16 50 to 17 50
prime mess .....do..	19 00..........	18 00 to 18 25	18 00..........	19 25..........	19 75 to 20 00
Lard ....lb..	13⅝........	13¾ to 14	13¼..........	14⅝..........	15⅜..........
Butter, western ....do..	18 to 33	16 to 30	16 to 28	14 to 24	12 to 17
State dairy....do..	30 to 42	27 to 40	22 to 40	16 to 33	15 to 28
Cheese, State factory..do..	14 to 16	14 to 16¼	14½ to 16¾	14 to 16⅝	14 to 16½
western fac'y..do..	12 to 15¾	12 to 15½	12¼ to 16½	12 to 15½	12 to 15½
Sugar, fair to prime refining ....lb..	8¼ to 8¼	7⅜ to 8⅛	7⅜ to 8⅛	7⅞ to 8¼	8¼ to 8⅝
Cotton, ordinary to good ordinary ....lb..	11⅝ to 13¼	12¼ to 14⅝	13⅝ to 15⅜	14 to 15½	13⅝ to 15⅝
low middling to good mid'ing.lb..	13¾ to 15	14⅞ to 16¼	15⅞ to 17⅛	16¼ to 17½	15⅞ to 17⅛
Tobacco, lugs ....do..	10½ to 13¼	10½ to 13¼	10 to 13	10½ to 13¼	9½ to 13
leaf ....do..	12¼ to 17	12¼ to 17	12¼ to 17	12¼ to 17	12¼ to 17
Wool, American XXX and picklock ......lb..	53 to 65	60 to 65	60 to 65	58 to 60	57 to 62
Amer. X and XX.do..	47 to 57	52 to 57	52 to 57	48 to 53	48 to 55
Amer. combing .do..	51 to 65	57 to 62	57 to 62	55 to 58	54 to 63
pulled ....do..	33 to 45	30 to 45	30 to 45	30 to 50	30 to 50
California spring clip ....lb..	25 to 37	30 to 37	30 to 37	25 to 35	24 to 34
Cal. fall clip.....do..	18 to 27	17 to 27	17 to 27	16 to 23	16 to 24
BOSTON.					
Flour, west'n superfine.bl..	4 00 to 4 50	4 00 to 4 50	4 25 to 4 50	4 25 to 4 50	4 50 to 4 75
common extras.do..	4 50 to 5 00	4 75 to 5 00	5 00 to 5 25	5 25 to 5 50	5 25 to 5 75
red wheats, good to fancy northw'n.bl.	5 25 to 9 00	5 00 to 8 50	5 25 to 8 00	5 50 to 8 00	5 50 to 8 50
white wheats, good to fancy west'n.bl.	5 00 to 8 00	5 50 to 7 50	5 50 to 8 50	5 75 to 8 00	6 00 to 8 00
southern family.do.	6 50 to 8 00	6 50 to 8 00	6 50 to 8 00	6 50 to 8 00	6 50 to 8 00
Corn ....bush.	90 to 92	85½ to 88	87 to 90	89½ to 92	92 to 95
Oats ....do..	66 to 72	67 to 70	70 to 74	70 to 75	72 to 77
Rye.....................do..	1 00 to 1 05	95 to 1 00	95 to 1 00	95 to 1 00	1 20 to 1 25
Barley ....do..	1 20 to 1 60	1 20 to 1 95	1 20 to 1 95	1 00 to 1 40	1 00 to 1 40
Hay, eastern and northern..............ton.	10 00 to 23 00	15 00 to 23 00	15 00 to 23 00	14 00 to 21 00	16 00 to 22 00
choice western...do..	22 00 to 23 00	21 00 to 22 00	21 00 to 22 00	....	....
Beef, mess.............bbl..	10 50..........	10 50 to 12 00	10 50..........	10 50..........	..........10 50
extra mess ......do..	13 50..........	12 50 to 14 00	..........13 00	13 00..........	..........13 00
family ....do..	16 00 to 17 00	16 00 to 17 00	16 00 to 17 00	16 00 to 17 00	....
Pork, prime ....do..	18 00..........	17 00 to 17 50	16 00 to 16 50	17 00 to 17 50	13 00 to 18 00
mess ....do..	21 00 to 21 50	21 00 to 21 50	20 00 to 20 50	22 00 to 22 50	22 50 to 23 00
Lard ....lb.	14 to 14½	14½ to 14¾	14½ to 15	14 to 15½	16 to 16½
Butter, New York and Vermont ....lb..	32 to 40	27 to 36	23 to 34	18 to 26	16 to 23
western ....do..	22 to 37	20 to 31	18 to 28	16 to 25	15 to 22
Cheese, New York and Vermont factory.lb..	13 to 16	14 to 16½	14½ to 16½	14½ to 16½	14½ to 16½

PRODUCTS FOR 1875.

as nearly as practicable, at the beginning of each month.

June.	July.	August.	September.	October.	November.	December.
$4 70 to $5 00	$4 50 to $4 80	$4 90 to $5 40	$4 85 to $5 50	$5 10 to $5 50	$5 10 to $5 40	$4 75 to $5 00
4 95 to 5 50	5 00 to 5 50	5 85 to 6 40	5 65 to 6 50	5 75 to 6 60	5 60 to 6 30	5 10 to 5 90
4 95 to 8 25	5 00 to 8 25	5 85 to 8 50	5 65 to 8 50	5 75 to 9 00	5 50 to 9 00	5 10 to 9 00
5 00 to 5 90	5 00 to 5 90	6 00 to 6 75	5 80 to 6 85	5 85 to 7 00	5 65 to 7 00	5 20 to 6 60
5 90 to 8 25	5 95 to 8 25	6 80 to 8 50	6 90 to 8 50	7 05 to 9 00	7 10 to 8 75	6 65 to 8 75
1 12½ to 1 16	1 22 to 1 25	1 45 to 1 47	1 44 to 1 45	1 38 to 1 41	1 36 to 1 43	1 35 to 1 39
1 07 to 1 12½	1 15½ to 1 21	1 34½ to 1 42	1 26 to 1 37	1 24 to 1 31½	1 28 to 1 34	1 24 to 1 28
1 22 to 1 32	1 30 to 1 36	1 48 to 1 54	1 44 to 1 48	1 20 to 1 44	1 23 to 1 45	1 15 to 1 40
1 22 to 1 32	1 30 to 1 36	1 48 to 1 54	1 44 to 1 48	1 20 to 1 44	1 23 to 1 45	1 15 to 1 40
1 25 to 1 33	1 31 to 1 40	1 52 to 1 58	1 46 to 1 53	1 32 to 1 65	1 35 to 1 50	1 35 to 1 48
1 10	1 03 to 1 05	1 00 to 1 10	98 to 1 00	90	75 to 88	87 ....
Nominal.	....	1 20	1 05	1 50 to 1 55	90 to 1 13	87 to 1 18
73 to 81	73 to 82½	81 to 89	73 to 80½	67½ to 73	70 to 76½	71 to 76
69 to 75	63 to 68	64 to 72	40 to 62	35 to 54	40 to 50	41 to 51
16 00 to 21 00	17 00 to 22 00	19 00 to 24 00	19 00 to 21 00	15 00 to 20 00	17 00 to 21 00	18 00 to 22 00
12 00 to 14 00	13 00 to 14 00	15 00	16 00	14 00 to 15 00	14 00	14 00 to 15 00
9 50 to 10 50	8 00 to 9 50	8 00 to 9 50	8 00 to 9 50	8 50 to 10 00	11 50 to 12 00	11 50 ....
10 50 to 12 00	10 00 to 10 75	10 00 to 10 75	10 00 to 11 00	10 50 to 11 50	12 00 to 13 00	12 50 ....
20 70 to 20 75	20 70 to 20 85	21 00 to 21 25	20 90 to 21 00	22 00 to 22 50	22 75 to 23 00	21 50 to 22 50
15 37½ to 15 75	16 00 to 16 50	16 00	16 00 to 16 25	16 00 to 16 50	16 00 to 16 50	16 00 to 16 50
18 75	19 00 to 19 50	18 00 to 19 25	19 25 to 19 50	19 50 to 20 00	19 50 to 20 00	20 00 to 21 50
13¼ to 14⅜	12¾ to 14	12⅝ to 13⅞	12¾ to 13⅝	12⅜ to 14	12¾ to 13⅝	12 to 12⅞
14 to 24	16 to 27	17 to 24	22 to 32	19 to 34	18 to 34	18 to 34
16 to 28	20 to 30	22 to 35	23 to 32	25 to 37	23 to 36	23 to 36
10 to 12½	10¾ to 12¼	10¼ to 12¼	9½ to 11¼	10 to 13½	7½ to 14	7½ to 13½
10 to 12	9¾ to 11½	9¼ to 11½	8 to 10¼	10 to 12⅛	6 to 13¼	6 to 12½
8⅛ to 8½	7¾ to 8¼	8⅛ to 8½	7⅞ to 8⅛	7¾ to 8¼	7¼ to 8	8 to 8½
13½ to 15¼	12⅞ to 14½	12½ to 13¾	12¼ to 12⅞	10¼ to 12	11¾ to 13¼	11 to 12¾
15¾ to 17	15 to 16¼	14¼ to 15½	13¼ to 15⅞	12¾ to 15⅝	13½ to 14½	12¾ to 13¾
9¼ to 13¼	9½ to 13¼	8½ to 11	8 to 11	7 to 10	7 to 9	7 to 9
12¼ to 17	12¼ to 17	11 to 15½	11 to 15⅛	10 to 14	9½ to 13	9½ to 13
37 to 62	55 to 60	55 to 60	50 to 54	50 to 54	50 to 54	48 to 57
50 to 55	50 to 53	50 to 52	43 to 48	43 to 48	43 to 48	40 to 48
54 to 65	54 to 63	54 to 63	55 to 65	55 to 65	55 to 65	50 to 62
30 to 48	30 to 50	30 to 52	27 to 46	27 to 46	27 to 46	20 to 47
22 to 35	23 to 34	23 to 34	22 to 32	22 to 32	22 to 32	20 to 33
16 to 24	18 to 24	18 to 24	18 to 22	18 to 22	17 to 22	17 to 25
4 25 to 4 75	4 00 to 4 50	5 00 to 5 25	5 25 to 5 50	4 50 to 5 00	5 00 to 5 25	4 50 to 4 75
5 00 to 5 50	4 75 to 5 25	5 75 to 6 25	6 00 to 6 50	5 50 to 6 00	5 50 to 6 00	5 25 to 5 75
5 50 to 8 50	5 00 to 8 00	6 00 to 9 00	6 25 to 9 00	6 00 to 9 25	6 00 to 9 25	5 75 to 8 75
6 25 to 8 25	6 00 to 8 00	6 50 to 9 00	7 00 to 9 25	6 75 to 9 00	6 50 to 9 00	6 50 to 8 75
7 00 to 8 50	6 50 to 8 00	7 00 to 8 50	7 50 to 9 25	7 50 to 9 00	6 50 to 9 00	7 50 to 9 00
82 to 85	90 to 91	90 to 93	80 to 86	74 to 77	79 to 83	74 to 80
73 to 78	62 to 75	67 to 76	47 to 62	42 to 56	43 to 56	41 to 55
1 15..........	1 15..........	1 10..........	95..........	1 00..........	95 to 1 00	95 to 1 00
Nominal.....	Nominal.....	Nominal.....	Nominal.....	1 10 to 1 35	1 00 to 1 30	90 to 1 30
16 00 to 23 00	16 00 to 22 00	16 00 to 22 00	17 00 to 23 00	17 00 to 23 00	13 00 to 22 00	13 00 to 22 00
....	....	....	....	....	....	....
..........10 50	10 50..........	10 00..........	10 00..........	10 00..........	10 00 to 11 00	11 50 ....
..........13 00	....	12 00..........	12 00..........	12 00..........	11 00 to 12 00	13 50 ....
....	....	16 00 to 17 00	17 00 to 17 50	17 00 to 17 50	16 50 to 17 00	16 50 to 17 00
17 00 to 17 50	16 50 to 17 00	16 50 to 17 00	16 00 to 17 00	16 50 to 17 00	16 00 to 17 00	15 50 to 16 00
21 50 to 22 00	21 00 to 21 50	21 50 to 22 00	22 00 to 22 50	22 50 to 22 75	23 00 to 23 50	22 50 to 23 00
15½ to 16 00	14 to 15	14 to 15	14½ to 15	14¼ to 15	13¼ to 14½	13¼ to 14½
15 to 26	18 to 27	18 to 27	20 to 30	20 to 33	22 to 33	22 to 34
14 to 18	17 to 24	16 to 28	18 to 33	18 to 34	18 to 34	15 to 33
10 to 12½	10 to 12½	10 to 12	9½ to 11½	10½ to 13½	10½ to 13½	10½ to 13½

MARKET PRICES OF FARM

The following quotations represent the state of the market, as

Products.	January.	February.	March.	April.	May.
BOSTON—Continued.					
Cheese, west'n factory..lb.	$0 12 to $0 15½	$0 13½ to $0 16½	$0 14 to $0 16½	$0 14 to $0 16	$0 14 to $0 16½
Sugar, fair to good refining..........lb..	8¼ to 8⅜	7¼ to 8⅛	7¼ to 7⅞	7⅞ to 8⅛	8¼ to 8½
Cotton, ordinary to good ordinary.....lb..	12¼ to 14	12¾ to 15	13½ to 15½	14 to 16	14 to 15¾
low middling to good middling, pound...........	14 to 15½	15 to 16½	15¼ to 17	16¼ to 17¾	16⅛ to 17¾
Wool, Ohio and Pennsylvania..........lb..	53 to 60	50 to 60	50 to 60	52 to 54	52 to 56½
Michigan ......do..	50 to 52	47 to 53	47 to 53	49 to 52½	48½ to 52½
other western ..do..	45 to 52	45 to 52	45 to 52	....	44 to 49
pulled..........do..	40 to 55	25 to 55	25 to 55	43 to 56	24 to 57½
combing fleece..do..	....	37 to 65	38 to 65	42½ to 66	39 to 70
California......do..	....	15 to 40	15 to 40	20 to 36	16 to 22
PHILADELPHIA.					
Flour, superfine ......bbl..	3 75 to 4 00	3 50 to 4 00	3 50 to 3 75	3 50 to 4 00	3 75 to 4 25
Pennsylvania extra to choice.....bbl..	4 25 to 5 75	4 00 to 5 75	4 00 to 5 75	4 00 to 5 75	4 25 to 6 00
western extra to choice ....bbl..	4 25 to 7 12½	4 50 to 5 75	5 25 to 6 00	5 00 to 7 00	5 50 to 6 25
Wheat, white ....bush.	1 35 to 1 40	1 25 to 1 32	1 25 to 1 31	1 32 to 1 37	1 40 to 1 50
amber..........do..	1 25 to 1 26	....	....	1 27 to 1 30	1 32 to 1 36
red............do..	1 22 to 1 23	1 15 to 1 18	1 16 to 1 20	1 20 to 1 28	1 30 to 1 34
Rye ....do..	1 00..........	95..........	95..........	1 05..........	1 05 to 1 08
Barley ....do..	1 60..........	1 40 to 1 50	1 40 to 1 45	1 20 to 1 50	Nominal.
Corn ....do..	80 to 84	77 to 79	79 to 81	82½ to 84	88 to 90
Oats ....do..	62 to 69	62 to 66	66 to 67	62 to 70	69 to 77
Hay, baled, prime.....ton.	20 00 to 22 00	21 00 to 22 00	21 00 to 22 00	21 00 to 22 00	22 00 to 24 00
baled, common to fair shipping.......ton.	19 00 to 20 00	20 00 to 21 00	20 00 to 21 00	19 00 to 20 00	20 00 to 22 00
Beef, western mess ...bbl..	7 00 to 8 00	7 00 to 8 00	7 00 to 8 00	7 00 to 8 00	7 00 to 8 00
extra mess.......do..	8 00 to 9 00	8 00 to 9 00	8 00 to 9 00	8 00 to 9 00	8 00 to 9 00
Warthman's city family.........bbl..	16 00..........	16 00..........	16 00..........	16 00..........	16 00..........
Pork, mess ....do..	20 00 to 20 50	19 50 to 20 00	19 50 to 20 00	21 50..........	22 50 to 23 00
prime mess......do..	18 00..........	17 50 to 18 00	18 50 to 19 00	19 75..........	20 00..........
prime...........do..	19 00..........	17 00 to 18 00	17 00 to 18 00	10 50 to 17 00	16 50 to 17 00
Lard ....lb..	13¾ to 18	13⅜ to 18	13⅞ to 17½	14½ to 18	16⅛ to 19½
Butter, choice Middle State ....lb..	32 to 44	32 to 40	35 to 40	23 to 20	27 to 30
choice western..do..	30 to 32	28 to 31	26 to 30	18 to 24	27 to 28
Cheese, New York factory...........lb..	16 to 16½	16 to 17	16 to 17	16 to 17	16 to 17
Ohio factory...do..	15 to 16	15 to 16½	15 to 16	15½ to 16	15 to 16½
Sugar, fair to good refining ....lb.	8⅛ to 8⅜	7⅛ to 8⅛	7⅝ to 8	7⅞ to 8⅛	8½ to 8¾
Cotton, ordinary to good ordinary ......lb.	11¼ to 11⅝	12¼ to 14¼	13 to 14⅝	13⅛ to 15¾	13⅜ to 15½
low middling to good middling.lb.	13⅝ to 14¾	14¼ to 16⅛	15⅛ to 17⅛	16¼ to 18	16 to 17¼
Wool, Ohio X and XX..do.	52 to 58	52½ to 57	54 to 56½	54 to 54½	51 to 55
other western....do.	 56	33½ to 54	49 to 56	....	45 to 53
tub-washed ......do.	55 to 62½	60 to 62½	54 to 61	55 to 62	54 to 70
pulled ....do.	43 to 52½	35 to 45	46 to 54	33⅛ to 50	27 to 47
combing ....do.	65 to 68	60 to 65	58 to 66	....	46 to 71
BALTIMORE.					
Flour, superfine ....bbl.	4 00 to 4 50	4 00 to 4 25	4 00 to 4 25	4 50 to 4 75	4 25 to 4 75
extra.............do.	4 75 to 6 00	4 50 to 6 50	4 50 to 6 50	5 00 to 6 50	5 00 to 5 50
family and fancy.do.	5 50 to 8 50	7 00 to 8 50	7 00 to 8 00	7 00 to 8 00	6 00 to 8 50
Wheat, red ....bush.	1 15 to 1 28	1 14 to 1 21	1 10 to 1 20	1 22 to 1 34	1 30 to 1 40
amber..........do..	1 15 to 1 35	1 20 to 1 22	..........1 25	1 22 to 1 34	1 42 to 1 44
white ....do..	1 20 to 1 35	1 17 to 1 25	1 10 to 1 25	1 25 to 1 35	1 44 to 1 50
Rye ....do..	97 to 1 00	95 to 1 00	1 04 to 1 05	1 05 to 1 08	1 15 to 1 17
Oats ....do..	63 to 65	65 to 69	65 to 70	66 to 73	68 to 78
Corn ....do..	78 to 85	76 to 79	79 to 82	79 to 87	86½ to 92
Hay, Maryland and Pennsylvania..............ton.	15 00 to 20 00	16 00 to 21 00	19 00 to 22 00	20 00 to 24 00	16 00 to 24 00
Pork, mess ....bbl.	20 50..........	19 75 to 20 00	19 75..........	22 00..........	23 00..........
extra prime ......do.	17 00..........	....	....	17 00..........	17 00..........
Lard ....lb.	14⅛..........	13¾..........	14½..........	15 to 15½	16¼ to 17
Butter, western ....do.	18 to 35	17 to 32	17 to 32	14 to 22	11 to 26

PRODUCTS FOR 1875.

nearly as practicable, at the beginning of each month—Continued.

June.	July.	August.	September.	October.	November.	December.
$0 9 to $0 12½	$0 10 to $0 12	$0 9 to $0 11	$0 9 to $0 11	$0 10 to $0 13½	$0 8 to $0 13½	$0 8 to $0 13
8 to 8¼	7⅞ to 8½	8⅜ to 8⅞	8 to 8¼	7⅞ to 8¼	7⅞ to 8½	8⅛ to 8⅜
13½ to 15½	13 to 14½	12½ to 14½	12½ to 14½	11 to 12½	11⅞ to 12⅞	11 to 12⅝
15¾ to 17	15½ to 16½	15 to 16½	14⅞ to 15¾	13 to 14½	13½ to 14½	13 to 14
50 to 57	48 to 52	45 to 53	41 to 50	44 to 49	42½ to 50	42½ to 50
45 to 52	48 to 51	43 to 47	43 to 45	42 to 43	42 to 45	45
45 to 50	45 to 50	43 to 46	40 to 45	40..........	42 to 43	42..........
25 to 55	30 to 54	20 to 50	25 to 50	29 to 53	35 to 58	15 to 56
60 to 70	41½ to 57	55 to 59	41 to 57	37 to 60	38 to 62½	40 to 64
14 to 36	18 to 38½	14 to 38	12 to 27	16 to 37	16 to 36	15 to 35
4 25 to 4 50	4 00 to 4 50	4 25 to 4 50	4 75 to 5 00	4 75 to 5 00	4 62½ to 5 00	4 25 to 4 75
5 00 to 6 25	4 25 to 6 00	4 50 to 6 50	5 25 to 7 00	5 00 to 7 00	4 75 to 6 75	4 75 to 6 50
5 50 to 6 25	5 50 to 6 00	5 00 to 6 75	6 25 to 7 50	6 12½ to 7 50	6 00 to 6 75	6 00 to 6 50
1 35 to 1 42	1 35 to 1 40	1 40 to 1 45	1 50 to 1 63	1 40 to 1 60	1 45 to 1 55	1 45 to 1 52
1 32 to 1 36	1 30 to 1 32	....	....	1 25 to 1 42	1 32	.... 1 41
1 30 to 1 34	1 26 to 1 30	1 30 to 1 36	1 35 to 1 48	90 to 1 40	1 00 to 1 40	1 20 to 1 40
1 10 to 1 12	1 03 to 1 05	1 05 to 1 10	90 to 95	90 to 92	75 to 78	86 to 89
Nominal.....	....	....	....	....	....	....
81 to 84	78 to 81	84 to 87	78 to 82	69 to 74	72 to 75	74 to 75
67 to 71	58 to 64	58 to 66	43 to 74	39 to 55	35 to 48	35 to 50
24 00 to 25 00	23 00 to 25 00	23 00 to 25 00	23 00 to 25 00	23 00 to 25 00	23 00 to 25 00	22 00 to 24 00
22 00 to 23 00	20 00 to 22 00	20 00 to 22 00	20 00 to 22 00	20 00 to 22 00	20 00 to 22 00	20 00 to 22 00
7 00 to 8 00	7 00 to 8 00	7 00..........	7 00..........	7 00 to 8 00	7 00 to 8 00	7 00 to 8 00
8 00 to 9 00	8 00 to 9 00	8 00 to 9 00	8 00 to 9 00	8 00 to 9 00	8 00 to 9 00	8 00 to 9 00
16 00..........	16 00..........	16 00..........	16 00..........	16 00..........	16 00..........	16 00 ....
20 50 to 21 00	20 75 to 20 50	21 25 to 21 50	21 00..........	22 00 to 22 50	22 25 to 22 75	22 50 to 23 00
17 50..........	17 50..........	17 50..........	18 00..........	20 00..........	18 50..........	19 75 to 20 00
15 00 to 15 25	15 50..........	15 00 to 15 50	15 00 to 15 50	16 50 to 17 00	16 00 to 17 00	17 00 to 17 50
15 to 18½	14 to 17½	14¾ to 17½	13½ to 17½	13½ to 17	13½ to 14½	13 to 17
25 to 29	23 to 30	24 to 35	26 to 39	28 to 33	28 to 38	29 to 40
22 to 28	17 to 22	20 to 23	20 to 30	29 to 31	28 to 31	28 to 31
10 to 12½	9 to 13	9 to 12	8 to 12	11 to 13½	12 to 14½	12 to 14
11 to 12½	9 to 11	10 to 10¾	7 to 10½	10½ to 12½	10 to 13½	10 to 13½
8½ to 8¾	7⅞ to 8½	8½ to 8⅞	7½ to 8¼	7⅞ to 8½	7⅞ to 8½	8¼ to 8½
13⅞ to 15½	12⅝ to 14½	11½ to 13½	11½ to 14½	11 to 13½	11 to 13	10½ to 12¾
16 to 17½	15½ to 17	14¾ to 16½	14½ to 15½	13½ to 14½	13½ to 14½	13 to 14½
50 to 55	50 to 54	50 to 52	45 to 47	45 to 51	45 to 47	48 to 48½
45..........	35 to 50	48 to 52	44 to 48	40 to 45	40 to 45	42 to 48
55 to 57	50 to 61	50 to 58	50 to 58	42 to 58	54 to 60	42 to 56
38 to 52	26 to 52	38 to 45	26 to 45	42 to 63	38 to 40	37 to 60
42..........	52 to 62	52 to 65	58 to 65	46 to 65	62 to 64	46 to 66
4 50 to 4 75	4 25 to 4 75	4 25 to 5 00	4 75 to 5 50	4 25 to 5 00	4 50 to 5 00	4 25 to 4 50
5 00 to 5 75	5 00 to 5 50	5 25 to 6 00	5 75 to 6 75	5 25 to 5 75	5 00 to 5 50	4 75 to 5 50
5 75 to 8 25	5 50 to 6 50	6 50 to 8 50	7 00 to 9 00	6 00 to 9 00	5 75 to 8 75	5 25 to 8 75
1 20 to 1 32	1 16 to 1 30½	1 20 to 1 40	1 15 to 1 48	1 10 to 1 40	1 36 to 1 48	1 10 to 1 43
1 34 to 1 37	1 28 to 1 32	1 40 to 1 45	1 50 to 1 55	1 45 to 1 55	1 50 to 1 55	1 45 to 1 50
1 30 to 1 38	1 15 to 1 35	1 25 to 1 40	1 20 to 1 50	1 20 to 1 40	1 20 to 1 50	1 15 to 1 45
1 14 to 1 22	95 to 1 00	93 to 1 03	75 to 1 05	80 to 85	80 to 85	75 to 85
69 to 75	62 to 68	60 to 68	40 to 52	45 to 52	40 to 48	37 to 50
73 to 89	76 to 87	83 to 92	71 to 87	63 to 80	63 to 77	57 to 71½
21 00 to 24 00	19 00 to 26 00	23 00 to 28 00	25 00 to 30 00	20 00 to 27 00	19 00 to 25 00	20 00 to 26 00
21 50..........	21 00..........	21 75 to 22 00	22 00 to 22 25	23 00 to 23 50	23 50..........	19 50 to 22 50
17 00..........	16 50..........	16 00 to 16 25	16 50..........	15 50..........	16 50..........	16 75 to 17 00
15½ to 17	14½..........	14½ to 14½	14½ to 14¾	14½ to 17	14½ to 17	13½ to 14
13 to 27	13 to 20	16 to 22	18 to 25	19 to 30	26 to 28	20 to 30

MARKET PRICES OF FARM

The following quotations represent the state of the market, as

Products.	January.	February.	March.	April.	May.
BALTIMORE—Continued.					
Butter, eastern ....lb.	$0 22 to $0 40	$0 22 to $0 35	$0 22 to $0 35	$0 16 to $0 25	$0 15 to $0 28
Cheese, western factory-do.	14½ to 15½	14½ to 15½	14½ to 15¾	14½ to 16	14½ to 16
eastern factory.do.	15 to 16½	15 to 17	15 to 17	15 to 17	15 to 17
Sugar, fair to good refining ....lb.	7¾ to 8¼	7¾ to 8	7¾ to 8	7⅞ to 8⅞	8⅛ to 8⅜
New Orleans, grocery grades....lb.	7½ to 8½	7¾ to 8½	8¼ to 8½	8¼ to 9	....
Tobacco, lugs ....do.	6 to 11½	8 to 12	9½ to 12	8 to 11½	9½ to 14
common to medium leaf......lb.	8 to 14½	10 to 14½	12 to 14½	12 to 14	11 to 14½
Cotton, ordinary to good ordinary......lb.	.... 13¼	14 to 14¾	.... 14¾	.... 15¾	14 to 15
low middling to middling .....lb.	13¾ to 14	15 to 15⅜	15⅜ to 16	16⅛ to 16¾	15½.........
CINCINNATI.					
Flour, superfine ....bl.	3 75 to 4 10	4 00 to 4 25	3 85 to 4 15	4 00 to 4 25	5 25 to 5 50
extra............do.	4 70 to 4 90	4 65 to 4 90	4 65 to 4 85	4 70 to 4 90	5 75 to 6 00
family ....do.	4 90 to 5 10	5 00 to 6 00	4 95 to 6 45	5 00 to 6 40	6 00 to 7 00
Wheat, winter, red...bush.	1 07 to 1 10	1 08 to 1 12	1 07 to 1 09	1 10 to 1 14	1 32 to 1 35
hill, (amber)...do..	1 12 to 1 14	1 10 to 1 16	1 08 to 1 15	1 13 to 1 18	1 35 to 1 38
white ....do..	1 14 to 1 22	1 14 to 1 20	1 14 to 1 20	1 15 to 1 22	1 35 to 1 40
Rye ....do..	1 09 to 1 10	.... 1 10	1 11 to 1 12	1 12 to 1 15	1 20 to 1 22
Barley ....do..	1 25 to 1 48	1 25 to 1 55	1 15 to 1 32	1 00 to 1 40	1 35 to 1 60
Corn ....do..	70 to 71	 68	65 to 66	71 to 72	73 to 77
Oats ....do..	59 to 63	57 to 62	59 to 63	60 to 84	66 to 69
Hay, baled, No. 1 ......ton.	20 00 to 21 00	21 00 to 22 00	20 00 to 21 00	19 00 to 21 00	20 00 to 22 00
lower grades.....do..	14 00 to 19 00	14 00 to 19 00	14 00 to 19 00	14 00 to 18 00	15 00 to 18 00
Beef, plate.............bbl.	....	14 00 to 14 50	14 50 to 15 00	....	....
Pork, mess ....do..	19 00 to 19 25	19 00 to 19 25	18 50 to 19 00	21 50 to 22 00	22 00 to 22 50
Lard ....lb..	13½ to 14¼	13¾ to 14½	13½ to 14¼	14½ to 15	15½ to 17
Butter, choice ....do..	28 to 30	29 to 30	27 to 28	26 to 28	27 to 30
prime ....do..	24 to 25	26 to 28	24 to 26	23 to 25	18 to 22
Cheese, prime to choice factory ....lb..	15 to 15½	15½ to 16	15½ to 16½	15 to 16	13 to 14
Sugar, New Orleans, fair to good ......lb..	8 to 9	7¾ to 8⅝	7¾ to 8⅝	8 to 8¼	8⅛ to 8⅞
New Orleans, prime to choice.....lb..	9¼ to 9½	8¾ to 9¼	8¾ to 9¼	8½ to 8¾	9⅛ to 9½
Tobacco, lugs..........lb..	12 to 25	12 to 15	12 to 15	20 to 25	10 to 12½
leaf ....lb..	15 to 37½	15 to 37½	15 to 40	25 to 40	15 to 20
Cotton, ordinary to good ordinary ....lb..	10¼ to 12¼	11⅛ to 11⅝	12¼ to 13¾	13 to 14½	13⅛ to 14⅝
low middling to good middling.lb.	13 to 14½	14⅛ to 15¼	14½ to 15¼	15¼ to 16½	15⅛ to 16⅛
Wool, fleece, common to fine ....lb..	43 to 47	43 to 47	43 to 47	43 to 47	43 to 45
tub-washed.....do..	48 to 50	49 to 52	49 to 52	49 to 52	43 to 46
unwashed, clothing ....lb..	32 to 33	32 to 33	32 to 33	32 to 33	30 to 32
unwashed, combing ....lb..	35 to 38	37 to 38	37 to 38	37 to 38	36 to 38
pulled ....lb..	35 to 38	36 to 38	36 to 38	36 to 38.	35 to 36
CHICAGO.					
Flour, choice winter, extras ....bbl..	5 25 to 6 50	5 25 to 6 50	5 25 to 6 50	5 50 to 6 75	5 50 to 7 00
common to good winter extras ...bbl..	4 25 to 5 00	4 25 to 5 00	4 25 to 5 00	4 50 to 5 00	5 00 to 5 25
choice spring extras ....bbl..	4 40 to 4 60	4 50 to 4 75	4 25 to 4 50	4 62½ to 4 75	5 00 to 5 25
patent springs..do..	6 00 to 10 00	5 00 to 9 00	5 00 to 9 00	5 00 to 9 00	6 00 to 9 00
spring superfines. bbl	3 00 to 3 75	3 00 to 3 75	3 00 to 3 90	3 50 to 4 00	3 75 to 4 25
Wheat, No. 1 spring .bush.	93¼ to 93½	.... 94½	90 to 91	1 00 to 1 03	1 09.........
No. 2 spring...do..	90¼ to 90½	88 to 90¾	85½ to 86½	94⅝ to 96¾	1 04 to 1 05½
No. 3 spring...do..	84½ to 84⅝	82½ to 83	82 to 82¼	91½ to 91¾	98 to 99½
Rye No. 2 ....do..	98 to 99	94 to 97	98 to 99	1 00 to 1 01	1 09.........
Barley No. 2...........do..	1 24 to 1 28½	1 23¼ to 1 28	1 13 to 1 15	1 02 to 1 07	1 30 to 1 32
Corn No 2..............do..	61 to 62½	64⅝ to 64⅞	64⅜ to 64⅝	68 to 69	76 to 76½
Oats No. 2.............do..	51¾ to 52⅛	52⅝ to 52⅞	53¾ to 56¼	55½ to 58	62 to 62½
Hay, timothy..........ton.	15 00 to 18 50	15 50 to 17 50	17 00 to 18 75	17 00 to 19 00	16 00 to 19 00
prairie ....do..	11 50 to 12 50	9 50 to 12 50	13 50 to 14 50	13 50 to 16 50	8 50 to 15 00
Beef, mess ....bbl..	8 25..........	8 25..........	8 25..........	8 25..........	8 25..........
extra mess.......do..	9 25..........	9 25..........	9 25..........	9 25..........	9 25..........
Pork, mess.............do..	19 05 to 19 12½	18 40 to 18 42½	18 20 to 18 22½	21 00 to 21 32½	21 25 to 22 05
prime mess .....do..	16 75 to 17 00	16 00..........	....	18 00 to 18 25	19 90..........
extra prime.....do..	14 00 to 14 50	13 25..........	....	15 00 to 15 25	15 75..........

PRODUCTS FOR 1875.

nearly as practicable, at the beginning of each month—Continued.

June.	July.	August.	September.	October.	November.	December.
$0 18 to $0 28	$0 14 to $0 22	$0 16 to $0 23	$0 18 to $0 35	$0 20 to $0 35	$0 26 to $0 35	$0 20 to $0 35
11 to 12	10 to 11	11 to 12	10 to 11½	11 to 13	12 to 13½	12 to 13¼
13 to 14	12 to 13	13 to 14	11 to 13	12½ to 13½	13 to 14¼	12 to 13½
8 1-16 to 8 5-16	7¾ to 8	8 1-16 to 8 5-16	7⅜ to 8¼	7¾ to 8¼	7¼ to 8	8 3-16 to 8 7-16
....	....	8⅜ to 8½	8⅜ to 8⅝	....	....	....
8 to 12	8 to 12	8 to 12	8 to 11	8½ to 11	6½ to 9	6½ to 9
12 to 14½	12 to 14½	12 to 14½	10 to 14	10 to 14	9 to 11	9 to 11
.... 14¾	 14	.... 13½	.... 13½	....	.... 12¼	 12
15¼ to 15⅜	14¾ to 15⅛	14 to 14½	14¼ to 14⅝	12½ to 13¼	12⅝ to 13	12⅜ to 12⅝
4 80 to 5 05	4 50 to 4 75	4 75 to 5 00	5 25 to 5 50	4 50 to 5 00	4 00 to 4 25	4 00 to 4 25
5 15 to 5 30	5 00 to 5 25	5 90 to 6 15	6 00 to 6 25	5 25 to 5 75	4 50 to 5 00	4 50 to 5 00
5 50 to 7 00	5 30 to 7 00	6 10 to 7 75	6 40 to 8 50	6 25 to 8 25	5 40 to 6 25	5 30 to 6 25
1 20 to 1 25	1 17 to 1 22	1 00 to 1 50	1 25 to 1 50	1 10 to 1 42	1 00 to 1 45	1 15 to 1 45
1 25 to 1 30	1 22 to 1 28	....	1 30 to 1 40	....	....	....
1 28 to 1 35	1 25 to 1 30	1 45 to 1 50	1 30 to 1 40	1 30 to 1 50	1 00 to 1 45	1 25 to 1 55
1 15	1 00	95 to 1 10	85	60 to 80	73 to 80	55 to 80
1 45 to 1 55	1 25 to 1 30	1 15 to 1 30	1 15 to 1 45	75 to 1 45	50 to 1 20	50 to 1 25
71½ to 74	67 to 68	71½ to 74	70 to 75	60 to 65	45 to 63	47 to 65
63 to 67	54 to 58	66 to 70	30 to 50	30 to 48	25 to 42	25 to 42
18 00 to 20 00	15 00 to 16 00	18 00 to 22 00	23 00 to 24 00	20 00 to 22 00	18 00 to 19 00	18 00 ....
15 00 to 17 00	9 00 to 14 00	9 00 to 14 00	20 00 to 22 00	14 00 to 18 00	12 00 to 16 00	11 00 to 17 00
....	....	....	....	....	....	....
20 00 to 20 50	20 00	20 50 to 21 00	20 75 to 21 25	22 25 to 22 75	21 00 to 22 00	20 75 to 22 00
13¼ to 16½	14¼ to 16	13¾ to 15¼	12¾ to 15½	13½ to 14½	12⅜ to 13¼	12⅛ to 15
22 to 25	19 to 22	20 to 24	28 to 31	28 to 35	26 to 30	27 to 28
18 to 22	16 to 18	18 to 20	24 to 25	22 to 25	25 to 26	25 to 26
10½ to 11	10 to 11	10 to 10½	10⅛ to 11	12 to 13	13 to 14	12⅛ to 13
8½ to 8⅞	8½ to 8⅞	8¾ to 9¼	.... 9½	....	8¼ to 8¾	8¾ ....
9⅛ to 9½	9⅛ to 9½	9½	9⅛	....	....	....
10½ to 12⅛	25 to 30	19 to 20	15 to 20	7 to 9	15 to 20	15 to 20
15 to 20	30 to 38½	12 to 30	28 to 30	12 to 15	28 to 30	28 to 30
12⅞ to 14	11½ to 13	11⅜ to 12¼	....	10¾ to 11¾	10⅜ to 11⅜	10⅛ to 11⅛
14¾ to 15¾	14 to 15	13¾ to 14¾	....	12⅝ to 13⅛	12¼ to 13⅛	12 to 12⅞
43 to 45	40 to 43	40 to 52	43 to 50	38 to 43	38 to 43	38 to 43
....	....	....	....	43 to 48	43 to 58	43 to 48
30 to 31	28 to 32	28 to 32	25 to 32	31 to 32	28 to 30	25 to 30
38 to 40	38 to 40	35 to 38	34 to 38	34 to 38	34 to 38	37 to 38
35 to 38	33 to 38	33 to 38	31 to 37	31 to 37	31 to 38	31 to 37
7 00 to 8 00	7 00 to 7 25	6 50 to 7 25	6 50 to 7 50	6 50 to 7 50	7 00 to 8 00	6 50 to 7 50
6 00 to 6 75	5 50 to 6 50	6 00 to 6 50	6 25 to 6 50	5 75 to 6 50	5 75 to 6 75	5 25 to 6 25
5 00 to 5 25	4 75 to 5 50	5 50 to 6 00	5 75 to 6 25	5 50 to 6 00	5 50 to 6 00	5 25 to 5 75
6 75 to 8 00	6 25 to 8 00	6 75 to 8 50	6 75 to 8 50	6 75 to 8 50	6 75 to 8 50	6 50 to 7 50
3 50 to 4 00	3 50 to 3 75	3 75 to 4 12½	3 75 to 4 25	3 75 to 4 75	3 75 to 4 50	3 00 to 4 00
94½ to 98½	1 06 to 1 06½	1 25¾ to 1 26	1 22 to 1 25	1 16	....	1 06½ ....
91 to 93	1 02½ to 1 05	1 23¾ to 1 24¼	1 13¼ to 1 14¼	1 11 to 1 13	1 08½ to 1 13	1 03 to 1 04
88	1 00	1 16 to 1 16¾	1 07 to 1 17	99 to 1 02	94 to 94½	86 to 87½
1 02 to 1 03	90 to 91	80 to 82	65 to 81	55½ to 56	68 to 68½	68 ....
1 20 to 1 23	1 02	1 07½ to 1 08	1 10	72	81 to 83½	86 ....
62½ to 64	67 to 68	62 to 71¼	61¾ to 63¼	1 02 to 1 03	51¼ to 52	47¾ to 48½
57½ to 58¼	52 to 52½	52 to 52½	34 to 35	34 to 37½	31¼ to 31¾	30⅛ to 30⅜
18 50 to 21 00	17 00 to 20 00	14 00 to 19 00	16 00 to 19 50	.... 16 00	14 00 to 16 00	12 00 to 15 50
12 00 to 18 00	9 00 to 16 00	9 00 to 16 50	11 50 to 15 50	10 50 to 12 00	8 50 to 11 00	7 00 to 10 50
8 50	8 25	8 25	8 50	9 00	10 00	9 75 to 10 00
9 50	9 25	9 25	9 50	10 00	11 00	10 75 to 11 00
19 25 to 20 00	19 45	20 75	20 50 to 20 75	22 75	21 00 to 21 50	19 37½ to 19 40
....	....	....	....	....	18 00 to 18 25	17 50 to 17 75
15 00 to 15 25	14 50	14 25	14 00 to 14 25	....	14 00 to 14 25	14 00 to 14 25

MARKET PRICES OF FARM

The following quotations represent the state of the market, as

Products.	January.	February.	March.	April.	May.
CHICAGO—Continued.					
Lard ....lb..	$0 13 1-10	$0 13½ to $0 13⅝	$0 13 1-5 to $0 13⅜	$0 14½ to $0 14⅝	.........$0 15⅜
Butter, choice to fancy.do..	30 to 37	30 to 37	30 to 36	25 to 31	25 to 31
medium to good.do..	24 to 27	23 to 26	23 to 25	17 to 21	17 to 20
Cheese, good to prime factory ....lb..	14 to 15½	16 to 18	17 to 18	16 to 18	16¼ to 17
Sugar, New Orleans, common to choice........lb..	7 to 9	7 to 9	7 to 8⅝	7¼ to 9	7½ to 9
Wool, tub-washed.....do..	45 to 57	55 to 57	45 to 58	49 to 58	45 to 58
fleece, washed ..do..	40 to 48	46 to 48	40 to 50	40 to 52	40 to 50
unwashed ......do..	27 to 36	27 to 37	27 to 37	27 to 37	27 to 37
pulled ....do..	42 to 47	42 to 47	42 to 47	42 to 47	42 to 47
SAINT LOUIS.					
Flour, winter, common to choice ....lb..	4 00 to 7 00	4 00 to 7 00	4 00 to 7 00	4 00 to 7 00	5 75 to 6 75
spring..........do..	4 00 to 5 50	4 00 to 5 50	4 00 to 5 50	4 00 to 5 50	5 40 to 6 00
Wheat, white, winter. bush.	83 to 1 08	95 to 1 05	95 to 1 05	1 05 to 1 14	1 30 to 1 32
red, winter.... do..	95 to 1 06	95 to 1 08	95 to 1 08	1 04 to 1 14	1 20 to 1 40
spring.........do..	85 to 90	87 to 98	87 to 98	94 to 98	1 00 to 1 12
Corn ....do..	64 to 74	60 to 70	62 to 71	65 to 76	70 to 84
Rye ....do..	90 to 97	1 00 to 1 05	1 00 to 1 05	1 02 to 1 06	1 03 to 1 10
Barley ....do..	1 00 to 1 50	1 10 to 1 55	1 10 to 1 55	1 00 to 1 35	1 32½ to 1 37½
Oats ....do..	55 to 62	53 to 59	55 to 60	60 to 69	60 to 68
Hay, timothy..........ton.	19 90 to 22 00	19 00 to 22 00	19 00 to 22 00	19 00 to 23 00	19 00 to 23 00
prairie..........do..	12 00 to 16 00	12 00 to 13 00	12 00 to 13 00	12 00 to 13 00	13 00 to 15 00
Beef, mess............bbl..	14 00 to 15 00	14 00 to 15 00	14 00 to 15 00	14 00 to 15 00	14 00 to 15 00
Pork, mess ....do..	19 25 to 19 75	18 50 to 18 75	18 50 to 18 75	20 50 to 21 00	21 00 to 22 00
Lard ....lb..	12 to 14	12 to 14	12 to 14	12 to 14	12 to 14
Butter, prime to choice dairy ....lb..	30 to 33	30 to 33	30 to 33	30 to 33	27 to 28
prime to choice country p'k'd.lb..	25 to 29	23 to 25	23 to 25	18 to 27	15 to 20
Cheese, Ohio factory...do..	13 to 13½	13 to 13½	13 to 13½	13 to 13½	13 to 13½
N. Y. factory ..do..	13 to 13½	13 to 13½	13 to 13½	13 to 13½	13 to 13½
Wool, tub-washed ......do..	50 to 54	50 to 54	50 to 54	53 to 55	53 to 55
fleece-washed...do..	30 to 52	32 to 52	32 to 52	32 to 52	32 to 52
unwashed ......do..	28 to 36	28 to 36	28 to 36	28 to 36	28 to 36
NEW ORLEANS.					
Flour, superfine ......bbl..	5 00..........	4 75..........	4 50..........	5 00..........	5 25 to 5 50
extra ....do..	5 25 to 5 62½	5 00 to 5 75	4 65 to 5 25	5 37½ to 6 00	5 75 to 6 37½
choice to fancy .do..	5 75 to 6 75	5 75 to 6 75	5 50 to 6 25	6 00 to 6 75	6 50 to 7 25
Corn, white and yel'w. bush.	90 to 93	86 to 88	1 02½ to 1 05	86 to 88	86 to 87
Oats ....do..	72 to 73	71 to 73	71 to 73	74 to 78	73½ to 75
Hay, choice ....ton.	....	26 00 to 27 00	30 00 to 31 00	29 00..........	26 00 to 28 00
prime............do..	24 00..........	24 00..........	24 00 to 25 00	24 00...... ...	24 00 to 24 50
Beef, Texas...........bbl..	11 20..........	10 50 to 11 50	10 00 to 11 50	10 00 to 11 50	11 00 to 11 50
western ....do..	11 00 to 11 50	12 00 to 16 00	14 00 to 16 00	14 00 to 16 00	14 00 to 16 00
Fulton market. ½ bbl..	11 50..........	11 25 to 11 50	11 40 to 11 50	11 40 to 11 50	11 40 to 11 50
Pork, mess ....bbl..	20 00 to 21 00	20 50 to 21 12½	19 00 to 20 00	22 37½ to 23 00	23 00 to 23 25
Lard ....lb..	12¾ to 14¾	13¾ to 15	14 to 15	14½ to 15½	15 to 16½
Butter, choice Goshen.do..	43..........	38 to 40	35 to 38	30 to 32	30 to 33
choice western.do..	30 to 32	27 to 30	35 to 38	12 to 22	15 to 20
Cheese, choice western factory ....lb..	16 to 16½	16½..........	16.........	15 to 16	 16
N. Y. cream ...do..	18..........	16¼ to 17	18½..........	18 to 18⅜	18 to 18½
Sugar, fair to fully fair.do..	6¾ to 7¾	6½ to 7¼	6⅞ to 7½	7 to 7½	8¼ to 8½
prime to strictly prime ....lb..	7⅞ to 8¼	7⅛ to 7¾	8 to 8⅛	8 to 8⅛	9..........
clarified, white, and yellow ....lb..	8⅛ to 9½	8½ to 9¾	9¼ to 10⅜	9½ to 10½	9⅝ to 9¾
Cotton, ordinary to good ordinary ....lb..	11¾ to 13½	12⅛ to 13½	13 to 14⅛	13⅝ to 14¼	13⅛ to 14⅜
low middling to good mid'ng.lb..	14⅝ to 17⅛	14⅛ to 15⅛	15 to 16⅔	15¼ to 16⅛	14⅞ to 16⅛
Tobacco, lugs ....do..	....	....	....	9 to 11½	9 to 12
low leaf to medium leaf ....lb..	....	....	....	12 to 14	12 to 14⅛
SAN FRANCISCO.					
Flour, superfine ......bbl..	3 00 to 4 30	4 00 to 4 50	4 00..........	4 00 to 4 37½	4 00 to 4 35
extra ....do..	4 50..........	4 75..........	4 25..........	4 50 to 4 80	4 50 to 4 80
family and fancy.do..	4 75 to 5 12½	5 12 to 5 37½	5 00 to 5 25	5 00 to 5 25	5 00 to 5 50

PRODUCTS FOR 1875.

nearly as practicable, at the beginning of each month—Continued.

June.	July.	August.	September.	October.	November.	December.
..........$0 14½	$0 13 1-6 to $13½	$0 13⅛ to $0 13½	$0 12⅞	$0 13⅝ to $0 13⅞	$0 12 1-6	$0 12¼ ....
24 to 30	20 to 23	23 to 28	25 to 29	26 to 31	30 to 33	25 to 32
18 to 22	15 to 18	15 to 20	18 to 21	18 to 23	20 to 24	19 to 23
11 to 22	10 to 11	10 to 11	10½ to 11¼	10 to 11¼	11¼ to 13	11 to 13
....	....	....	7¼ to 9½	7¾ to 9½	7½ to 9¼	7½ to 8¾
....	40 to 53	40 to 53	40 to 53	40 to 53	44 to 52	44 to 52
43 to 45	38 to 43	38 to 43	39 to 41	40 to 43	38 to 44	38 to 44
25 to 34	25 to 33	25 to 33	26 to 33	26 to 33	25 to 33	25 to 33
....	....	....	....	....	....	....
4 75 to 7 75	4 75 to 7 75	4 25 to 7 50	4 25 to 7 50	00 to 7 50	4 00 to 6 75	5 00 to 6 75
4 50 to 5 50	4 50 to 5 50	3 75 to 5 00	3 75 to 5 00	3 75 to 5 75	....	....
1 30 to 1 32	1 25 to 1 32	1 20 to 1 28	1 28 to 1 38	1 30 to 1 60	1 10 to 1 35	1 10 to 1 20
1 14 to 1 38	1 10 to 1 32	1 12 to 1 38	1 08 to 1 46	1 10 to 1 60	1 00 to 1 55	1 00 to 1 51
95 to 1 07	95 to 1 00	1 03 to 1 20	1 05 to 1 15	....	....	....
64 to 78	63 to 73	65 to 72	60 to 70	52 to 67	46 to 68	35 to 47
1 03 to 1 10	85 to 94	85 to 1 03	72 to 80	65 to 71	50 to 68	54 to 68
1 25 to 1 50	1 25 to 1 50	1 25 to 1 50	1 18 to 1 30	1 00 to 1 32	55 to 1 30	40 to 1 15
60 to 68	52 to 60	52 to 60	29 to 40	30 to 46	28 to 42	28 to 39
19 00 to 23 00	19 00 to 21 00	12 20 to 22 00	18 00 to 21 00	16 00 to 18 50	16 50 to 18 00	14 50 to 16 50
13 00 to 15 00	11 00 to 13 00	10 00 to 13 00	7 00 to 12 00	7 00 to 9 50	8 00 to 10 50	8 00 to 10 00
14 00 to 15 00	14 00 to 15 00	14 00 to 15 00	14 00 to 15 00	14 00 to 15 00	14 00 to 14 50	14 00 to 14 50
21 00 to 22 00	21 00 to 22 00	20 00 to 21 00	20 50 to 21 00	22 50 to 23 25	21 60 to 22 00	21 60 to 21 75
12 to 14	12 to 14	12 to 14	13 to 15	12 to 14	14¼ to 14¾	12¾ to 13
27 to 28	27 to 28	27 to 28	27 to 28	27 to 28	28 to 30	28 to 30
15 to 20	14 to 16	16 to 20	18 to 22	20 to 23	20 to 25	20 to 25
13 to 13¼	13 to 13¼	13 to 13½	13 to 13¼	10 to 11½	12½ to 13¼	13 to 14
13 to 13½	13 to 13½	13 to 13½	13 to 13½	13 to 13½	13 to 14	13 to 14
53 to 55	53 to 55	51 to 53	50 to 51	44 to 50	49 to 50	42 to 50
32 to 52	32 to 52	37 to 47	37 to 47	35 to 38	47 to 48¼	38 to 42
28 to 38	28 to 36	30 to 38	30 to 38	27 to 37	25 to 35	30 to 38
5 25..........	4 50 to 4 62	4 75 to 5 00	5 25..........	4 50..........	4 30 to 4 50	4 25..........
5 37½ to 6 25	4 75 to 5 75	5 62½ to 6 75	5 50 to 6 50	4 75 to 6 25	4 75 to 5 75	4 50 to 5 25
6 50 to 7 50	6 00 to 7 00	7 00 to 7 75	6 75 to 8 00	6 50 to 9 00	6 00 to 8 25	5 62½ to 7 25
.... 88	88 to 90	86 to 94	86 to 94	72 to 78	75 to 85	54 to 60
72 to 73	66 to 68	65 to 70	40 to 60	40 to 52	43 to 54	37 to 52
....	26 00..........	26 00 to 28 00	26 00 to 27 00	..........24 00	27 00..........	24 00..........
25 00 to 26 50	25 00..........	23 00..........	26 00..........	21 50..........	22 00 to 25 00	20 00 to 22 00
10 00 to 11 50	10 00 to 11 50	10 00 to 11 50	10 00 to 11 50	10 00 to 10 50	10 00 to 10 50	....
16 00..........	16 00..........	16 00..........	16 00..........	16 00..........	16 00..........	12 00 to 17 00
11 50 to 12 50	11 50 to 12 50	11 00 to 12 50	11 00 to 12 00	11 50 to 12 00	11 50 to 12 00	11 50..........
21 00 to 21 50	21 50 to 21 75	22 50..........	22 25 to 22 50	23 75 to 24 50	24 00 to 24 37½	22 50 to 23 25
15 to 16	14¼ to 15½	14 to 15	14½ to 15½	14¼ to 15¼	14¼ to 15¼	13¼ to 14¼
33..........	30 to 33	30 to 33	32 to 34	35..........	33 to 35	33 to 35
30 to 33	22 to 24	20 to 22	22 to 24	25..........	23 to 28	22 to 25
8 to 14	10 to 12	11 to 12	11..........	10 to 10½	13½ to 14½	13..........
18..........	17 to 17½	....	17½ to 18	14 to 16	16..........	14 to 15
8 to 9	8½ to 9	8¾ to 9¼	9¼ to 10	8¾ to 9¼	7 to 7¼	6¼ to 7
9¼ to 9½	9¼ to 9¾	9¾ to 10	10 to 10½	9¼ to 9¾	8¾..........	7¼ to 7¾
9½ to 10½	9¾ to 10½	9¾ to 11	10½ to 10¾	9¾ to 10¼	8¾ to 9½	8¾ to 9
13 to 13½	12½ to 13	11 to 12	11½ to 12¾	.... 11¾	.... 11¾	10¼ to 10¾
14¾ to 15¾	14½ to 15¼	13 to 15	13½ to 15	12½ to 13¾	12½ to 14¾	12½ to 13½
9 to 12	9 to 12	....	....	7½ to 10	7 to 9	7 to 9
12 to 14½	12 to 14½	....	....	11 to 20	9½ to 17	9¼ to 14½
4 00 to 4 25	4 00 to 4 50	5 00 to 5 50	5 25 to 5 50	5 00 to 5 25	4 50 to 5 00	4 50 to 5 00
4 50 to 4 75	4 75 to 4 80	6 00 to 6 50	6 00 to 6 25	5 50 to 5 75	5 25 to 5 75	5 25 to 5 50
5 00 to 5 50	5 00 to 5 62½	6 75 to 7 00	6 50 to 7 00	6 00 to 6 50	6 00 to 6 50	5 75 to 6 25

MARKET PRICES OF FARM

The following quotations represent the state of the market, as

Products.	January.	February.	March.	April.	May.
SAN FRANCISCO—Cont'd.					
Wheat, California ..cental.	$1 40 to $1 60	$1 50 to $1 60	$1 40 to $1 60	$1 50 to $1 70	$1 60 to $1 85
Oregon........do..	1 40 to 1 55	1 50 to 1 60	1 50 to 1 60	1 50 to 1 70	1 60 to 1 80
Barley..............do..	1 20 to 1 50	1 45 to 1 70	1 25 to 1 50	1 40 to 1 60	1 00 to 1 75
Oats..................do..	1 45 to 1 75	1 60 to 1 85	1 60 to 1 85	1 55 to 1 80	2 10 to 2 25
Corn..................do..	1 30 to 1 45	1 45 to 1 55	1 40 to 1 60	1 40 to 1 60	1 50 to 1 60
Hay, State ....ton.	12 00 to 16 00	12 00 to 17 00	9 00 to 16 00	10 00 to 17 00	12 00 to 18 00
Beef, mess............bbl..	8 00 to 9 00	8 00 to 8 50	8 00 to 9 00	8 00 to 9 00	8 50 to 9 50
family mess..½bbl..	6 50 to 8 00	6 50 to 8 50	6 50 to 8 00	6 50 to 8 00	6 50 to 8 00
Pork, mess ....bbl..	23 00 to 24 00	24 00 to 25 00	22 00 to 23 00	22 00 to 23 00	22 00 to 23 00
prime mess ...do..	17 50 to 20 00	17 50 to 20 00	17 50 to 19 00	17 50 to 19 00	16 50 to 18 00
Lard ....lb..	13 to 15	13 to 16½	13 to 16½	13 to 17	14 to 16½
Butter, overland ......do..	25 to 40	30 to 40	25 to 50	20 to 25½	20 to 25
California.....do..	25 to 50	40 to 50	30 to 25	25 to 30	25 to 32½
Oregon........do..	20 to 35	30 to 35	20 to 25	20 to 22½	20 to 22½
Cheese.................do..	12½ to 16	12½ to 16	12½ to 16	12½ to 16	12½ to 16
Wool, native ....do..	12 to 20	10 to 20	10 to 20	10 to 20	10 to 20
California ...... do..	15 to 22	15 to 22	15 to 18	15 to 22	15 to 25
Oregon.........do..	18 to 22	18 to 22	18 to 22	18 to 22	18 to 25

LIVE STOCK

NEW YORK.					
Cattle:					
Extra beeves.....cental.	13 75 to 14 00	13 00 to 13 50	13 00 to 13 75	13 50 to 14 00	13 25 to 13 75
Good to prime do....do..	11 50 to 13 50	12 00 to 12 75	11 75 to 12 75	.........13 25	11 75 to 13 00
Common to fair do...do..	9 00 to 11 90	8 50 to 11 75	9 50 to 11 50	10 75 to 12 00	10 75 to 11 50
Texans..............do..	8 50 to 10 50	7 00 to 10 75	7 25 to 8 50	....	Nominal.....
Milch-cows.........head.	40 00 to 80 00	45 00 to 90 00	40 00 to 80 00	50 00 to 75 00	40 00 to 70 00
Veal-calves.......cental.	7 00 to 10 50	7 00 to 10 00	7 50 to 10 50	4 50 to 10 50	5 50 to 7 00
Sheep ....do..	6 00 to 7 50	5 50 to 8 00	5 37½ to 7 75	5 50 to 7 50	5 00 to 8 00
Swine....................do..	7 50 to 8 00	None in	market.	Few in market	None for sale.
PHILADELPHIA.					
Cattle:					
Prime beeves.....cental.	7 75 to 8 25	7 50 to 8 00	7 75 to 8 00	7 50 to 8 00	8 00 to 8 12½
Fair to good..........do..	6 00 to 7 50	5 25 to 7 25	5 50 to 7 25	6 25 to 7 25	6 50 to 7 75
Common...............do..	4 00 to 5 75	4 00 to 5 00	4 00 to 5 00	5 25 to 6 00	4 50 to 6 00
Sheep ....do..	5 00 to 8 00	5 75 to 7 25	4 50 to 7 50	4 50 to 7 75	5 00 to 8 00
Swine....................do..	9 75 to 10 75	9 00 to 10 50	11 00 to 11 50	12 00 to 13 00	11 00 to 13 50
BALTIMORE.					
Cattle:					
Best beeves ......cental.	5 50 to 7 12	5 25 to 7 25	5 25 to 7 00	6 25 to 7 30	6 75 to 7 50
First quality.........do..	4 37 to 5 50	4 62 to 5 25	4 50 to 5 25	5 12 to 6 25	5 50 to 6 75
Medium or good ....do..	3 75 to 4 75	3 50 to 4 62	4 00 to 4 50	4 62 to 5 12	5 00 to 5 50
Ordinary.............do..	3 00 to 3 75	3 00 to 3 50	3 25 to 4 00	3 50 to 4 62	4 00 to 5 00
General average of the market..........cental.	4 62..........	4 62..........	4 25..........	5 50..........	6 37..........
Most of the sales....do..	4 25 to 5 50	4 00 to 5 50	4 00 to 5 00	5 00 to 6 00	6 00 to 7 00
Milch-cows ....head.	30 00 to 45 00	35 00 to 50 00	30 00 to 50 00	30 00 to 48 00	30 00 to 48 00
Sheep ....cental.	2 25 to 6 50	4 50 to 7 00	4 50 to 7 25	4 50 to 8 00	4 50 to 7 50
Swine..................do..	9 00 to 9 75	8 50 to 9 00	9 50 to 10 25	9 75 to 11 50	10 00 to 11 50
CINCINNATI.					
Cattle:					
Good to prime butchers' steers ....cental.	4 75 to 6 00	4 75 to 5 75	5 25 to 6 00	5 50 to 6 25	6 00 to 6 50
Fair to medium .....do..	3 50 to 4 50	3 50 to 4 50	4 00 to 5 00	4 00 to 5 00	5 00 to 5 75
Common ....do..	2 50 to 3 25	2 50 to 3 25	2 50 to 3 25	2 75 to 3 75	3 75 to 4 75
Milch-cows ....head.	30 00 to 50 00	30 00 to 60 00	30 00 to 50 00	25 00 to 55 00	30 00 to 55 00
Veal-calves........cental.	3 50 to 5 50	5 50 to 7 00	6 25 to 7 50	5 50 to 7 00	5 50 to 7 00
Sheep..................do..	4 00 to 6 00	4 00 to 6 00	4 00 to 6 00	4 50 to 6 00	5 50 to 6 75
Swine..................do..	7 15 to 7 65	6 35 to 7 50	6 15 to 7 50	6 50 to 8 75	....
CHICAGO.					
Cattle:					
Extra graded steers, 1,300 to 1,550 pounds. cental.	6 50 to 7 35	6 25 to 6 75	6 25 to 6 65	6 40 to 6 90	6 30 to 6 75
Choice beeves, 1,250 to 1,450 pounds....cental.	5 75 to 6 25	5 60 to 6 00	5 60 to 6 00	5 85 to 6 25	6 00 to 6 20
Good beeves, 1,100 to 1,350 pounds.........cental.	5 25 to 5 70	5 00 to 5 50	5 00 to 5 50	5 50 to 5 75	5 80 to 6 00

PRODUCTS FOR 1875.

nearly as practicable, at the beginning of each month—Continued.

June.	July.	August.	September.	October.	November.	December.
$1 60 to $1 75	$1 60 to $1 75	$2 00 to $2 15	$2 00 to $2 15	$1 75 to $2 10	$1 85 to $2 05	$1 75 to $1 95
1 60 to 1 75	1 60 to 1 70	2 00 to 2 10	2 00 to 2 15	2 00 to 2 10	2 00 to 2 05	1 75 to 1 95
1 35 to 1 60	1 40 to 1 60	1 40 to 1 60	1 40 to 1 65	1 30 to 1 50	1 25 to 1 50	1 20 to 1 50
1 90 to 2 25	1 90 to 2 15	1 75 to 2 25	1 75 to 2 05	1 65 to 2 00	1 65 to 2 00	1 65 to 2 05
1 50 to 1 60	1 40 to 1 55	1 45 to 1 55	1 40 to 1 55	1 30 to 1 50	1 17½ to 1 40	1 22½ to 1 35
10 00 to 16 00	12 00 to 20 00	12 50 to 17 50	12 50 to 18 00	13 00 to 19 00	12 00 to 21 00	14 00 to 21 00
8 50 to 9 50	8 50 to 9 50	8 50 to 9 50	8 50 to 9 00	8 00 to 10 00	8 00 to 10 00	9 00 to 10 00
6 50 to 8 00	6 50 to 8 00	6 50 to 8 00	7 50 to 8 00	7 50 to 8 00	8 00 to 10 00	8 00 to 10 00
22 00 to 23 00	22 00 to 23 00	22 00 to 23 00	22 00 to 23 00	24 00 to 25 00	22 00 to 23 00	23 50 to 24 00
16 50 to 18 00	16 50 to 17 00	16 50 to 17 00	16 50 to 17 00	16 50 to 17 50	17 00 to 18 00	17 50 to 18 00
14 to 16½	14 to 16	15 to 16½	15 to 16½	15 to 16½	13½ to 16	13½ to 16
20 to 25	20 to 25	20 to 27	20 to 22	20 to 27	15 to 25	18 to 25
25 to 32½	20 to 35	25 to 35	30 to 45	30 to 47½	30 to 60	30 to 60
20 to 22½	20 to 22½	20 to 22½	20 to 25	20 to 25	20 to 25	20 to 25
12½ to 15	12½ to 15	12½ to 15	12½ to 15	12½ to 15	12½ to 15	12½ to 15
10 to 15	10 to 15	12 to 15	10 to 15	10 to 15	10 to 15	10 to 15
15 to 26	15 to 27	15 to 27	15 to 27	15 to 25	15 to 25	15 to 25
18 to 26	18 to 27	15 to 25	15 to 27	15 to 25	15 to 25	20 to 25

MARKETS.

13 25 to 13 50	13 25 to 13 50	13 00 to 13 50	13 00 to 13 50	12 50 to 13 00	13 00..........	12 75 to 13 50
12 00 to 13 00	12 25 to 13 00	12 00 to 12 75	11 50 to 12 75	12 25 to 12 50	11 75 to 12 75	11 50 to 12 50
10 25 to 11 75	11 50 to 12 00	11 25 to 11 75	10 75 to 11 25	10 75 to 11 00	8 00 to 11 50	8 50 to 11 25
9 00 to 12 25	7 00 to 10 75	6 50 to 11 50	7 25 to 9 50	8 50 to 11 00	6 50 to 8 50	7 50 to 10 50
50 00 to 90 00	50 00 to 108 00	40 00 to 100 00	45 00 to 75 00	....	....	....
4 50 to 8 25	5 00 to 7 50	6 00 to 10 00	7 00 to 10 00	7 50 to 9 50	....	7 50 to 10 00
5 25 to 7 00	4 25 to 8 50	4 25 to 6 25	4 50 to 6 50	5 25 to 7 25	4 75 to 6 00	4 50 to 6 50
None for sale.	9 25 to 9 75	....	..........8 37½	8 62½ to 8 80	8 66¼..........	7 50 to 7 56¼
8 00 to 8 50	8 25..........	7 25 to 7 87	7 50 to 8 00	7 62½ to 8 00	7 00 to 7 50	7 00 to 7 62½
6 25 to 8 00	6 00 to 8 00	6 00..........	5 75 to 7 25	6 00 to 7 50	5 50 to 6 75	5 50 to 6 75
5 00 to 6 00	4 00 to 5 75	3 75 to 5 75	4 00 to 5 50	4 00 to 5 50	3 50 to 5 50	4 00 to 5 50
4 50 to 5 75	4 50 to 6 00	4 50 to 6 00	4 00 to 6 00	4 50 to 6 00	4 50 to 6 00	4 50 to 6 00
11 50 to 12 50	11 00 to 11 50	11 25 to 11 50	11 50 to 12 50	12 00 to 14 00	11 50 to 12 25	10 50 to 11 50
6 25 to 7 50	6 00 to 7 25	5 72 to 7 12	6 25 to 6 75	6 75 to 7 25	5 62 to 6 12	6 12 to 6 50
5 25 to 6 25	5 00 to 6 00	4 50 to 5 62	4 75 to 6 25	4 75 to 5 75	4 50 to 5 62	5 12 to 6 12
4 75 to 5 50	4 50 to 5 00	3 75 to 4 50	3 50 to 4 75	3 75 to 4 75	4 00 to 4 50	4 25 to 4 75
4 50 to 4 75	3 50 to 4 50	3 25 to 3 75	2 75 to 3 50	3 50 to 3 75	2 50 to 3 50	3 00 to 4 25
6 37..........	6 00..........	5 50..........	4 50..........	4 50..........	4 12..........	4 62..........
5 75 to 7 00	5 50 to 6 50	5 00 to 6 00	4 00 to 5 12	4 00 to 5 00	3 50 to 4 75	4 25 to 5 25
30 00 to 45 00	30 00 to 40 00	35 00 to 42 00	30 00 to 42 00	....	35 00 to 40 00	....
4 00 to 5 50	4 00 to 5 00	4 00 to 5 50	4 00 to 5 50	4 00 to 5 50	4 00 to 5 50	4 00 to 5 25
10 00 to 10 75	9 50 to 10 00	10 25 to 11 00	10 00 to 11 50	10 50 to 11 75	10 50 to 10 75	8 75 to 10 00
5 75 to 6 50	5 00 to 5 75	5 75 to 6 00	5 00 to 5 50	5 00 to 5 50	4 00 to 5 50	4 75 to 5 25
4 50 to 5 50	3 50 to 4 75	4 25 to 5 50	3 25 to 4 75	3 75 to 4 75	3 00 to 4 00	3 50 to 4 50
3 50 to 4 00	2 00 to 3 25	2 50 to 4 00	2 25 to 3 25	2 25 to 3 25	2 00 to 3 00	2 50 to 3 25
25 00 to 55 00	30 00 to 45 00	40 00 to 55 00	20 00 to 50 00	....	30 00 to 60 00	25 00 to 50 00
4 00 to 6 00	3 50 to 4 50	5 00 to 6 50	4 50 to 6 50	5 50 to 7 00	2 50 to 7 00	....
3 25 to 5 00	3 50 to 3 50	3 25 to 4 50	3 00 to 4 50	2 50 to 4 75	3 25 to 5 25	3 25 to 5 50
7 30 to 7 50	6 75 to 7 20	7 60 to 7 90	6 50 to 8 40	6 00 to 8 00	6 75 to 7 60	6 90 to 7 50
6 40 to 6 60	6 62½ to 6 75	..........6 60	6 40 to 6 75	6 20 to 6 40	....	..........6 40
6 00 to 6 25	5 90 to 6 37½	6 00 to 6 30	5 75 to 6 25	5 20 to 6 00	5 80..........	6 00..........
5 75 to 5 90	5 65 to 5 75	5 75 to 5 85	5 00 to 5 60	4 80 to 5 25	4 75 to 5 20	4 00 to 5 40

LIVE STOCK

The following quotations represent the state of the market, as

Products.	January.	February.	March.	April.	May.
CHICAGO—Continued.					
Cattle:					
Medium, 1,150 to 1,350 pounds..........cental.	$3 75 to $5 25	$4 25 to $4 75	$4 25 to $4 75	$5 00 to $5 50	$5 50 to $5 75
Inferior natives.....do..	4 00 to 5 00	2 25 to 4 00	2 25 to 4 25	3 00 to 5 00	3 50 to 5 50
Texans ....do..	1 75 to 4 00	3 90 to 5 25	2 75 to 5 75	2 50 to 5 25	3 00 to 5 75
Sheep ....do..	3 00 to 6 50	3 75 to 5 75	3 50 to 6 00	3 75 to 6 50	3 00 to 6 50
Swine..................do..	6 25 to 7 25	6 25 to 7 40	5 75 to 7 30	7 10 to 8 75	7 00 to 8 75
SAINT LOUIS.					
Cattle:					
Good to choice native steers ....cental.	4 75 to 6 00	4 75 to 6 00	4 75 to 6 00	5 00 to 6 25	4 50 to 6 75
Common to fair natives ....cental.	3 25 to 4 50	3 25 to 4 50	3 25 to 4 50	3 50 to 4 75	3 25 to 4 75
Inferior to common...do..	2 00 to 3 50	2 00 to 3 50	2 00 to 3 50	2 00 to 3 50	1 50 to 2 87½
Texans, fair to choice.do..	2 50 to 3 75	2 50 to 3 50	2 50 to 3 50	1 75 to 4 00	2 00 to 4 25
Sheep ....do..	2 25 to 4 75	2 25 to 4 75	2 50 to 5 00	4 00 to 6 25	3 75 to 6 25
Swine ....do..	4 00 to 6 00	4 50 to 7 00	5 00 to 7 25	5 00 to 7 25	...........8 00
Horses:					
Plugs...............head.	40 00 to 75 00	40 00 to 75 00	40 00 to 75 00	40 00 to 75 00	40 00 to 75 00
Plain.................do..	80 00 to 110 00	80 00 to 110 00	80 00 to 110 00	80 00 to 110 00	80 00 to 110 00
Street-car ....do..	75 00 to 125 00	75 00 to 125 00	75 00 to 125 00	75 00 to 125 00	75 00 to 125 00
Heavy-draught.......do..	130 00 to 170 00	130 00 to 170 00	130 00 to 170 00	130 00 to 170 00	130 00 to 170 00
Good drivers ....do..	100 00 to 150 00	100 00 to 150 00	100 00 to 150 00	100 00 to 150 00	100 00 to 150 00
Extra ....do..	175 00 to 180 00	175 00 to 180 00	175 00 to 180 00	175 00 to 180 00	175 00 to 180 00
Mules:					
14 to 15 hands high.head.	75 00 to 120 00	75 00 to 120 00	75 00 to 120 00	75 00 to 120 00	75 00 to 120 00
15 to 16 hands high ..do..	120 00 to 180 00	120 00 to 180 00	120 00 to 180 00	120 00 to 180 00	120 00 to 180 00
Extra ....do..	175 00 to 200 00	175 00 to 200 00	175 00 to 200 00	175 00 to 200 00	175 00 to 180 00
NEW ORLEANS.					
Cattle:					
Texan be'v's, choice.head.	40 00 to 46 00	40 00 to 46 00	40 00 to 46 00	40 00 to 46 00	40 00 to 46 00
First quality..........do..	30 00 to 35 00	30 00 to 35 00	30 00 to 35 00	30 00 to 35 00	30 00 to 35 00
Second quality ......do..	20 00 to 25 00	20 00 to 25 00	20 00 to 25 00	20 00 to 25 00	20 00 to 25 00
Western..........cental.	4 00 to 6 00	4 00 to 6 50	3 00 to 7 50	3 00 to 7 50	3 00 to 7 50
Milch-cows ....head.	35 00 to 100 00	35 00 to 100 00	35 00 to 100 00	35 00 to 100 00	35 00 to 100 00
Sheep ....do..	3 00 to 5 00	3 00 to 5 00	3 00 to 7 00	3 00 to 7 00	3 00 to 7 00
Swine ....do..	5 00 to 7 50	5 00 to 8 00	5 00 to 8 50	5 00 to 6 00	5 00 to 8 50

MARKETS.

nearly as practicable, at the beginning of each month—Continued.

June.	July.	August.	September.	October.	November.	December.
$5 25 to $5 60	$4 90 to $5 12½	$5 00 to $5 55	$4 25 to $5 00	$4 15 to $5 65	$4 40 to $4 65	$3 00 to $3 75
2 50 to 3 25	....	....	2 25 to 4 00	1 75 to 3 75	2 55 to 4 05	2 50 to 3 00
3 00 to 4 50	2 30 to 2 70	3 15 to 4 40	2 25 to 3 75	2 50 to 3 75	2 75 to 3 75	2 75 to 4 00
3 50 to 5 75	2 50 to 4 25	2 75 to 5 00	3 00 to 5 12½	3 50 to 5 00	3 00 to 5 00	3 00 to 4 50
6 25 to 7 35	6 00 to 7 10	5 75 to 8 00	6 50 to 8 75	7 00 to 9 50	6 50 to 8 00	6 85 to 7 15
4 50 to 6 75	4 50 to 6 75	5 50 to 6 75	5 50 to 6 25	5 75 to 6 25	5 25 to 5 50	5 75 to 6 12
3 25 to 4 75	3 25 to 4 75	3 25 to 4 75	3 25 to 5 25	4 00 to 5 75	3 50 to 4 50	3 50 to 4 00
1 50 to 2 87½	1 50 to 2 87½	1 50 to 2 87	2 50 to 3 00	2 00 to 3 00	2 25 to 3 50	2 25 to 3 50
2 50 to 4 25	2 00 to 4 25	2 50 to 4 25	1 75 to 4 25	2 50 to 4 40	3 00 to 4 25	2 40 to 4 25
3 75 to 6 25	3 75 to 6 25	3 75 to 6 25	2 85 to 4 25	2 85 to 4 25	3 00 to 4 75	2 75 to 4 90
6 60 to 8 00	6 60 to 8 00	6 60 to 8 00	6 00 to 8 00	6 00 to 8 00	5 25 to 7 25	6 90 to 7 00
40 00 to 75 00	40 00 to 75 00	40 00 to 75 00	40 00 to 75 00	40 00 to 75 00	25 00 to 50 00	20 00 to 30 00
80 00 to 110 00	80 00 to 110 00	80 00 to 110 00	80 00 to 110 00	80 00 to 110 00	60 00 to 70 00	60 00 to 75 00
75 00 to 125 00	75 00 to 125 00	75 00 to 125 00	75 00 to 125 00	75 00 to 125 00	75 00 to 125 00	75 00 to 125 00
130 00 to 170 00	130 00 to 170 00	130 00 to 170 00	130 00 to 170 00	100 00	115 00 to 125 00	115 00 to 125 00
100 00 to 150 00	100 00 to 150 00	100 00 to 150 00	100 00 to 150 00	150 00	100 00 to 150 00	100 00 to 125 00
175 00 to 180 00	175 00 to 180 00	175 00 to 180 00	175 00 to 180 00	200 00	175 00 to 200 00	175 00 to 200 00
75 00 to 120 00	75 00 to 120 00	75 00 to 120 00	75 00 to 120 00	85 00 to 120 00	80 00 to 120 00	80 00 to 130 00
120 00 to 180 00	120 00 to 165 00	120 00 to 180 00	120 00 to 180 00	120 00 to 180 00	120 00 to 180 00	130 00 to 170 00
175 00 to 200 00	160 00 to 180 00	175 00 to 200 00	175 00 to 200 00	175 00 to 200 00	175 00 to 200 00	175 00 to 200 00
40 00 to 46 00	40 00 to 46 00	40 00 to 46 00	40 00 to 46 00	40 00 to 46 00	40 00 to 46 00	40 00 to 46 00
30 00 to 35 00	30 00 to 35 00	30 00 to 35 00	30 00 to 35 00	30 00 to 35 00	30 00 to 35 00	30 00 to 35 00
20 00 to 25 00	20 00 to 25 00	20 00 to 25 00	20 00 to 25 00	20 00 to 25 00	20 00 to 25 00	20 00 to 25 00
3 00 to 7 50	....	....	....	....	....	....
35 00 to 100 00	35 00 to 100 00	30 00 to 100 00	35 00 to 100 00	35 00 to 100 00	.... 90 00	40 00 to 90 00
3 00 to 7 00	3 00 to 5 00	2 00 to 5 00	2 00 to 5 00	2 00 to 5 00	2 00 to 6 00	2 00 to 6 00
5 00 to 10 00	5 00 to 10 00	5 00 to 10 00	5 00 to 10 00	8 00 to 11 00	8 00 to 11 00	7 00 to 8 50

A large proportion of the work of this division has been, as usual, the preparation of statements, from its records and such other sources as were available, for legislative or industrial bodies, and frequently for representative individuals in aid of labors in the interest of rural industry and the general welfare.

In another portion of this volume will be found somewhat extended statistics of forestry, prepared under the direction of the head of this division, in part the result of one of its special investigations.

Respectfully,

J. R. DODGE,
Statistician.

Hon. FREDK. WATTS.

REPORT OF THE ENTOMOLOGIST.

HETEROPTERA, OR PLANT-BUGS.

The order of the *Hemiptera* (or half-winged insects) contains the plant-bugs, which are all furnished with a beak, or rostrum, for piercing animal and vegetable substances, and for sucking out their sap, or juices, on which they principally exist. The larvæ and pupæ generally resemble the imago, or perfect insect, in form, and are mostly active in all the stages of their existence, from the egg to the full-grown insect. This order is divided into two suborders, viz, the *Heteroptera* and the *Homoptera*.

The *Heteroptera*, or true plant-bugs, possess four wings, the upper pair being of a dissimilar texture, hence the name of *Heteroptera*, from two Greek words signifying "dissimilar wings;" the anterior part of the upper pair being coriaceous, or leathery, in texture, while the terminal portion is membranous. The upper pair of wings also are larger than the lower pair, and partially overlap each other. The under wings are membranous, and concealed beneath the upper wings when the insect is at rest. A common garden-squash-bug will give the farmer a very good idea of the general form and structure of a true heteropterous insect, or plant-bug, when fully developed. The young are perfectly wingless in the pupa or nymph state. Having cast their skins, they acquire merely rudimentary wings, which are perfectly useless for the purpose of flying; and it is not until they are fully grown, and their skin has again been shed, that the insect acquires perfectly-formed wings, adapted for flight. Some of the bugs, however, never acquire wings at all, but remain apterous all their lives; the common bed-bug being a good example. Insects of the order *Hemiptera* only can properly be called "bugs," although in the United States, it is common to call almost all insects and creeping things indiscriminately "bugs," instead of using the proper names, beetles, grasshoppers, flies, &c., or insects, if spoken of in a more general sense. In Europe, the word "bug" is never used, except as applying to that disgusting little bloodthirsty nocturnal pest, the bed-bug; and the term is generally avoided as much as possible in general conversation, as being connected with filth and uncleanliness.

The second suborder of the *Hemiptera* is called *Homoptera*, also from two Greek words signifying "similar wings," as they possess four wings, all of which are of a similar texture, being entirely membranous, in many cases transparent, and often deflexed, or sloping downward like the roof of a house. The upper wings are longer

than the pair underneath, and do not lap over each other when the insect is at rest. These insects are also furnished with a beak, or sucker, with which they pierce principally vegetable substances to suck the sap, and in this manner, when numerous, are very injurious to the tender shoots or leaves of plants or trees. The common *Cicada*, or harvest-fly, (incorrectly called the locust,) and which makes such a buzzing sound in the trees in late summer and autumn, is a good example of some of the insects of this suborder. The small leaf-hoppers, (incorrectly known as the thrips of the grape-vine,) the small swiftly-running plant-bugs, and the *Aphides*, or plant-lice, belong also to the *Homoptera*, and are, most of them, more or less injurious, sucking the sap of plants, although at the same time some species are said to destroy other insects injurious to the crops.

We will now, however, return to the suborder *Heteroptera*, or true plant-bugs. These insects are frequently very destructive to thé crops, and destroy the plants by draining them of their sap; at the same time, they appear to inject a peculiar liquid into the wound, which poisons the part injured, discolors the edges of the puncture, and eventually kills the leaf if the insects are very numerous, as shown by the dead foliage injured by the common squash-bug. Others of the suborder *Heteroptera* are beneficial to the farmer and gardener by destroying other insects which prey upon the crops. They first kill their victims by piercing them with their powerful beaks; they then leisurely suck out their juices, and leave the empty skin of their prey as a proof of their voracious habits. It is, however, exceedingly difficult to distinguish whether certain plant-bugs are more injurious or beneficial; many of the plant-suckers occasionally varying their vegetable diet by making a meal on the life juices of some unfortunate, weak, or injured brother, which fact is exemplified in the common squash-bug, which has hitherto been considered as an exclusively vegetable-feeder, being twice taken in the very act of eagerly sucking out the juices of two of its relatives which had accidentally been disabled and crushed, but were still alive. A very good example of the injury done by this suborder of insects may be seen in the ravages committed by the chinch-bug, *Micropus leucopterus*, which is so abundant in some seasons in the more Western States, and does so much injury to the fields of grain; but of this insect we will speak more hereafter in this paper. The wheel-bug, *Prionotus cristatus*, (*Reduvius novenarius*,) also mentioned in a subsequent article, is a very good example of the class of carnivorous bugs, as it kills and feeds upon almost every other insect it can overcome, and, even when young, destroys its own brethren hatched from the same bunch of eggs as itself.

As it will be of very little interest to the farmer to explain the scientific classification of the suborder *Heteroptera*, (plant-bugs,) we will here merely state that in the arrangement of the following groups or families we have partially followed the classification of Amyot and Serville, which, although somewhat antiquated, at the same time appears to us to be the most natural and easy for beginners, as their arrangement is formed entirely on certain marked peculiarities in the structure of the insect visible to the naked eye: for example, in the size and form of the scutel, (a somewhat triangular shield between the bases of the upper wings and adjoining the thorax;) in the situation of the antennæ, or horns; the form and position of the beak; structure of the legs, if formed for walking or for swimming; and the absence or presence of ocelli. Suffice it to state here that the two great primary divisions are, firstly, the bugs frequenting the land, (*Geocorisæ*;) and, secondly, those frequenting or living in waters, (*Hydrorisæ*.)

The first family of the land-bugs is distinguished by the great size of their scutel, or shield. These insects are generally of moderate or large size, and have a long 4-jointed beak, or piercer, with elongated 5-jointed antennæ. Among these we frequently find several plant-bugs, which present the appearance of small beetles, as the scutel covers most of their back, and the wings are almost entirely concealed by this covering as with a coat of mail.

A good example of this class is *Corymelæna*, which is a small, almost round, black bug, (Fig. 1,) is abundant on strawberries, raspberries, cherries, and almost all other soft fruits; and when they are numerous they cause the stems of young fruit-trees to wither up and perish from their punctures. They are also said to injure grape-vines.


Fig. 1.

The genus *Tetyra* is also distinguished by its very large scutellum, which covers the whole of its abdomen, leaving only the side of the wing-covers exposed.

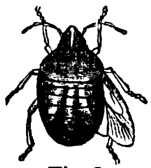


Fig. 2.

Tetyra bipunctata (Fig. 2) is a medium-sized, or rather large bug, of a brownish-gray color when dried, and is figured merely to show the size of the scutellum.

The following plant-bugs, with large scutella, may be classed as some of those most destructive to the foliage and shoots of various plants and trees.


Fig. 3.

Strachia (*Murgantia*) *histrionicha*, (Fig. 3,) commonly known as the harlequin cabbage-bug, from its mottled, bright, and harlequin-like colors of black, striped and variegated with bright-red or orange, in all their stages, from the egg up to the adult insect, are very destructive to the cabbage-crop in the more Southern States. They also destroy turnips, mustard, and other cruciferous plants. The Department has this year received many letters of complaint from the Southern States, giving details of their ravages in the cabbage-gardens. The eggs we have are oblong and very beautiful, being banded with dark-colored rings. These eggs are generally deposited in bunches of ten or twelve on the under side of the leaves. In March, in the far South, and in April, in the more Northern States, they are set in two rows, cemented together on the leaves, and only require four to six days to hatch out into larvæ, which, although very small, resemble the perfect insect, with the exception that they are wingless. Twelve to twenty-four days after the deposition of the eggs, the perfect insect is developed; and there are two broods or more annually in the extreme Southern States. They are said to pass the winter as perfect insects under stones, moss, or bark, and therefore might probably be destroyed by making small heaps of dry old corn-stalks or other inflammable materials in the neighborhood of the cabbage-gardens, under which the insects can creep as a shelter in very cold weather. These rubbish heaps should then be examined in autumn to see if many insects have taken refuge under them; and the first severely cold morning a little fire applied to the several heaps of trash will entirely destroy all the bugs hidden away for the winter under them, and so many perfect insects be prevented from laying the foundation of the spring broods. This is done in Florida with the cotton-stainer, or red bug, *Dysdercus* (*Pyrrhocoris*) *suturellus*, a somewhat similar bug, which does much injury to cotton. These fires, however, are made in Florida from the crushed trash of sugar-cane which is grown there. The sweet substance exuding from the crushed sugar-cane, as well as the shelter afforded from the cold weather, causes

these insects to collect together in immense quantities beneath the heaps. These insects are said by Dr. Lincecum to be very numerous and destructive in Texas. The leaves punctured by them immediately wilt as if from the effects of poison, and as many as 47,000 have been gathered in one instance by hand. We have not as yet heard of injury being done by them to any considerable extent in this neighborhood, although isolated specimens are by no means uncommon. Nauseous washes, such as whale-oil soap, even if they did drive away the insects for a time, would render the cabbages unedible for mankind; and poisons such as Paris green, if taken by the insects, would certainly be most dangerous to the consumers, even if washed off with half a dozen waters. These insects, however, are said to be destroyed by *Leptoglossus phyllopus*, (figured at No. 12.)

A large speckled gray tree-bug, resembling in color the bark of a tree, *Brochymena arborea*, (Fig. 4,) is not uncommon in Maryland on trees, and was taken in Baltimore as late as December 10 in 1874 on the door-steps. It feeds on the sap of trees, and hibernates under bark and logs in Maryland.

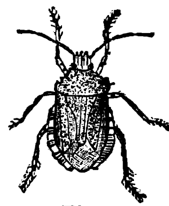


Fig. 4.

Nezara hilaris (*Rhaphigaster pennsylvanicus* of Fitch) (Fig. 5) is a large green tree-bug, which is found abundantly in Maryland, and feeds on the sap of trees. This insect is of a somewhat flattened form, of a grass-green color, edged all round with a yellow line, interrupted at each joint with a small black spot. Besides feeding on the sap of forest-trees, it punctures the leaves of the grape-vine and hickory-trees. This insect differs from the *R. pennsylvanicus* of De Geer in having the posterior angles of the pronotum triangular instead of rounded; and although in general appearance and habits these two insects are almost identical, with the exception of the angles of the pronotum, Prof. P. R. Uhler, of Baltimore, says, "These two insects are entirely separate as species." In Europe, a closely-allied *Rhaphigaster* deposits its eggs near each other, but never heaped up, and is found on the trunks of trees. Many of these land-bugs are especially provided with organs which exhale a scent more or less disagreeable; and if, irritated or menaced with danger, the insect is suddenly seized and placed in a vessel containing clear water, a number of small bubbles will be seen to come from its body, rise to the surface, then burst, and give out the disagreeable odor, which, however, in some species is rather pleasant in a small quantity, as it resembles somewhat the scent of a ripe pear.

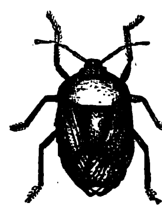


Fig. 5.

Acanthosoma nebulosa (Fig. 6) is a medium-sized brownish-gray plant-bug, feeding on the sap of trees and plants, and is here mentioned on the authority of Prof. P. R. Uhler as being the North American representative of the European species *Acanthosoma grisea*, of which De Geer, in his memoirs, gives a very interesting account; wherein he states that the females, accompanied by their respective broods, each consisting of from twenty to forty young ones, are found in July, and that the mother conducts the young as a hen does her chickens, never leaving them, but assembling them together in a cluster. When restless, she beats her wings as if to protect them; this is said to be done in order to protect them from the males, which otherwise would destroy them, (thus proving also the carnivorous propensities of these

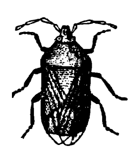


Fig. 6.

insects.) In Leunis, it is even stated that the mother is said absolutely to sit upon the eggs, as if to hatch them; but this fact is somewhat doubtful. More lately, however, Douglas states that Mr. Parfit, of Exeter, says that he saw "the mother insect watching over and protecting her young," and adds, "Indeed, I never saw such affection exhibited by any insect;" and as *Acanthosoma lateralis* of Say is said by Professor Uhler to be our American representative of this insect, there will be a very good opportunity for our young entomologists to prove or disprove the maternal solicitude of this insect by practical experience.

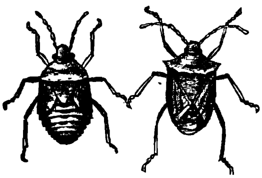


Fig. 7.

Euschistus (*Pentatoma*) *punctipes* (Fig. 7) is a middle-sized plant-bug, of a brownish-gray color, which is common on thistles, mulleins, and other weeds, and lives on the sap of plants. Many species of *Pentatoma* are insects of medium or large size, found on shrubs or trees, and live generally on the sap; but they are also somewhat beneficial by transfixing caterpillars with their beaks to extract their juices, and eventually killing them. Their eggs are usually of an oval form, and attached by a glutinous substance at one end to leaves or branches, the other end being furnished with a cap or cover, which the young larvæ burst off when they hatch out. These larvæ are also more convex and less flattened out than the adults.

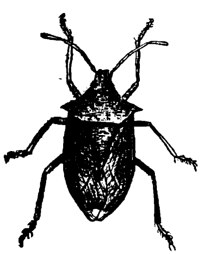


Fig. 8.

Podisus cynicus, (Fig. 8,) (*Arma grandis* of Dallas,) or the large tree-bug of Fitch, is of a dull pale-yellowish or brownish color, and is very common in Maryland. It feeds on the sap of the apple, oak, and other trees. Dr. George R. Morton, of North Bass Island, Ohio, is said to have found one of these insects sucking the juices from a young Colorado potato-beetle, (*Doryphora* 10-*lineata*.) The insect is somewhat the shape of a pumpkin-seed, and has a conspicuous sharp spine projecting outward on each side of the thorax.

Fig. 9.

Another smaller species, *Podisus* (*Arma*) *spinosus*, (Fig. 9,) or the spined tree-bug, a brownish or grayish plant-bug nearly the color of tree-bark, injures leaves of apple and other trees by sucking out the sap; but at the same time it is said to be very beneficial to the farmer or gardener by destroying the Colorado potato-beetle. Indeed, this plant-bug is said by some to be one of the bitterest enemies of that insect, and therefore, although it may perhaps do some injury to fruit-trees, it may be regarded as a public benefactor, and preserved from injury. The spined tree-bug is said also to destroy the American gooseberry saw-fly (*Pristiphora grossulariæ* of Walker) and other insects.

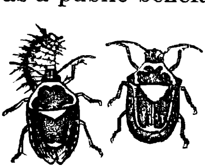


Fig. 10.

Stiretrus diana, (*anchorago*, Fab.,) (Fig. 10,) a beautifully-marked plant-bug of a purple black color, with red or orange ornamental marks on the thorax and scutel, was found in Maryland busily employed in killing and sucking out the juices of the larva of the squash-ladybird, (*Epilachna borealis*,) and no doubt it destroys also any other soft-bodied larva it can overcome, and should be protected as a benefactor to the farmer.

Stiretrus fimbriatus, a near relative, the ground-colors of which are orange or yellow, with black ornamentations, (Fig. 11,) is very rapacious and carnivorous, as it feeds almost entirely on other insects, including the Colorado potato-beetle. It destroys caterpillars of the black asterias, swallow-tail butterfly, which are so injurious to parsley, parsnips, celery, &c., in our gardens, and probably also the social caterpillars in the web-nets, which disfigure our shade and fruit trees.

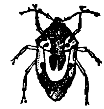


Fig. 11.

The second family of the *Geocorisæ*, or land-bugs, is that of the *Supericornes*, so called because the antennæ are inserted on the upper side of the head above an ideal line drawn from the eyes to the origin of the labrum.

Some of the insects of this family are said to be beneficial to the farmer by destroying other injurious insects, among which may be classed *Leptoglossus phyllopus*, (*Anisoscelis albicinctus*,) (Fig. 12,) a reddish-brown or blackish bug, with a distinct dirty-white or yellowish band across its wing-covers. It may easily be recognized by the singularly broad, flattened, leaf-like projections on its hind shanks. When young the insects are of a bright-red color. We have met with these insects frequently in Florida on the cotton-plants, and at first suspected them of sucking the sap from the young bolls; but, although we watched their actions diligently, we must say that we never saw them in the act of piercing the bolls in order to suck the sap, and only once caught them under suspicious circumstances where a boll had been pierced in several places, and the sap was exuding from the wounds. Several of these insects were gathered together very near the flowing sap; they, however, dispersed as soon as they were observed, and flew away immediately. Although we never saw them destroy other insects, yet a correspondent, Mr. E. J. Earle, of Evergreen, S. C., in 1869, in a letter sent to the Department of Agriculture, states that he had seen this insect (of which he sent a specimen) in the very act of destroying the cabbage-plant-bug, before mentioned.

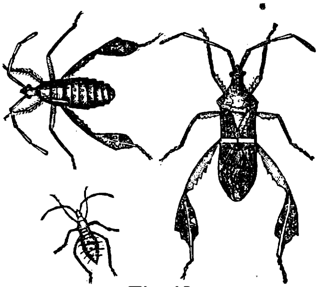


Fig. 12.

The genus *Acanthocephala* (*Rhinuchus* and *Metapodius*, syn.) is the largest and most powerfully-developed of the *Heteroptera* in this country, and is generally found in the Southern States. The insects frequent cotton-fields, but have never been detected in the act of piercing the cotton-bolls or of destroying other insects.

Acanthocephala (*Metapodius*) *femorata*, (Fig. 13,) so called from its swollen spiny thighs, is a large reddish-brown or blackish insect, quite abundant in the Southern cotton-fields. It is very slow in its motions, and appears to be fond of basking in the sun. The thighs are strongly developed and spiny, especially on the under side, while the shanks have broad, thin, plate or leaf-like projections on their sides, which give these insects a very peculiar appearance. The eggs are smooth, short, oval, and have been found

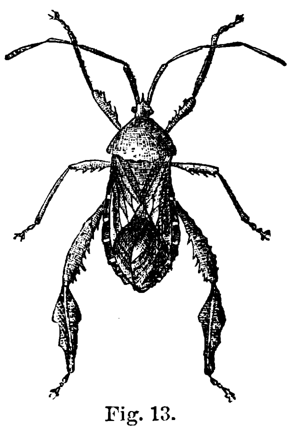


Fig. 13.

arranged in beads like a necklace, on the leaf of white pine. The full-grown insect is stated to injure cherries in the Western States by puncturing them with its beak and sucking out the juices; thus proving it at least in one instance to be a feeder on vegetable substances.

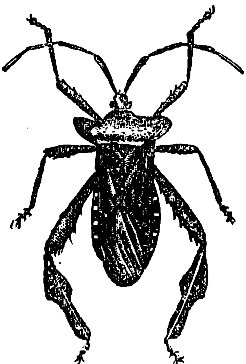


Fig. 14.

Acanthocephala declivis (Fig. 14) resembles the above-mentioned insect in general size and form, but differs materially in the shape of the thorax, which is much broader, and projecting outward and forward. It also has strong spiny hind thighs and the peculiar flattened plate-like shanks. The natural history and habits of these insects have been very little studied; but, of all the specimens taken in the Southern States, we never yet took one in the act of killing other insects.

Pachylis gigas (Fig. 15) is here figured as one of the largest and most gaudily-colored heteropterous insects found in this country, and as yet appears to be essentially Southern and rather scarce. Its markings are of a bright-red orange on a black ground; the contrast between the two colors being very marked and distinct, rendering the insect plainly visible at a great distance.

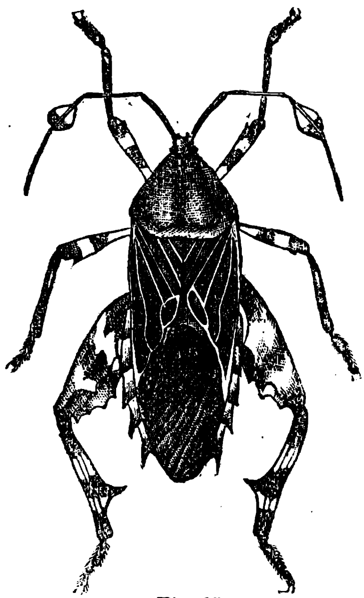


Fig. 15.

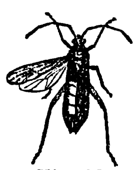


Fig. 16.

Alydus eurinus, (Fig. 16,) a slender bug, with several sections of the upper part of the abdomen of a bright-red color when the wings are opened, "occurs in late summer and autumn, sometimes in great numbers, on golden-rod and other herbaceous plants, growing near the edges of woods, also on the *Rhus glabra* or smooth sumach.—(P. R. U.) *Alydus ater* (Fig. 17) is the female.

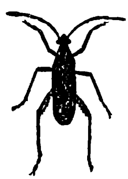


Fig. 17.

One of the most destructive plant-bugs in this family is the squash-bug, *Anasa tristis*, (Fig. 18,) (*Coreus* and *Gonocerus tristis* of some authors.) The eggs are said to be round, flattened on the sides, and of a metallic-brown color. They are deposited in little patches, fastened with a gummy substance to the under side of the leaves of squashes and other *Cucurbitaceæ*, in June and July, &c., until late autumn. These eggs are not deposited all at one time on the plants, but in successive broods during the whole season. The larvæ, pupæ, and perfect insects, all being active, indiscriminately attack the leaves, and cause them to wither up by sucking out the sap and apparently poisoning the foliage. They moult their skins several times

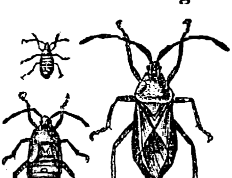


Fig. 18.

before attaining the winged or perfect state, and become more oval in form as they grow older; and, as there are successive broods during the whole summer, they do much injury to the squash and pumpkin vines. These insects sometimes collect in masses around the stem near the earth, and injure the plant itself by extracting the sap with their piercers. When handled or disturbed, they give out an odor somewhat similar to that of an overripe pear, but which is too powerful to be agreeable. The perfect insects, late in the autumn or when cold weather begins, leave the plants, and hibernate, or pass the winter, under bark of trees, in moss, or in crevices in stone walls, and in old fences. In Maryland, they have been taken in midwinter in old, decayed stumps of trees, in a perfectly torpid state; but, when exposed to moderate heat, they soon regained their vitality. These insects have been reported by some farmers as beneficial by destroying the Colorado potato-beetle, (*Doryphora decemlineata;*) but this report is probably incorrect, and the bug reported as seen killing the Colorado potato-beetle was probably *Podisus* (*Arma*) *spinosus*, or the bordered soldier-bug, before mentioned, and which is well known to feed on other insects, and somewhat resembles the squash-bug in form, size, and color, and, by the uninitiated, might readily be mistaken for it. We once, however, saw the mature squash-bugs busily engaged in sucking out the juices from the body of a young insect of their own species that had accidentally been crushed on a squash-leaf. For remedies see last part of this article.

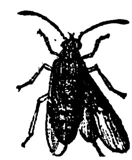


Fig. 19.

A small plant-bug, *Rhopalus lateralis*, (Fig. 19,) probably feeds on the sap of plants, as Mr. Walsh states that an insect allied to this is one of the commonest bugs near Rock Island, Ill., and ruins the buds of the pear-tree. The antennæ are clubbed at the end.

Neides (*Berytus*) *spinosus* (Fig. 20) is a remarkably slender bug, with very long, slim, hair-like legs and antennæ, and is figured merely to show the singular form and structure of the insect. Another species, *N. elegans* of Europe, is taken about the roots and young stems of the rest-harrow, (*Ononis arvensis*,) and with regard to its habits Wedwood states that as the larvæ and pupæ were discovered in company with the imago, it appears evident this was its food-plant. Of *N. tipularia*, another allied European species, Amyot states that it is found in humid, obscure places, climbing and crawling slowly on high plants; and Wolf found it common in sand at the roots of different plants.

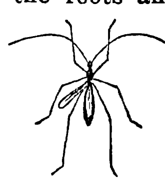


Fig. 20.

The third family is that of the *Infericornes*. These insects are distinguished by the antennæ being inserted below an ideal line drawn from the eyes to the origin of the labrum, or below the middle of the side of the head. The third joint of the beak is longer than the fourth.

In the *Lygæides*, the antennæ are four-jointed; the terminal joint not being thinner or forming a terminal club. They are generally rather small or of moderate size, and several species are beautifully marked; being black, variegated with bright crimson, red, orange, or yellow. They are mostly found on plants.

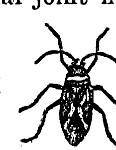


Fig. 21.

Lygæus turcicus (Fig. 21) is common in Maryland, and is of ~~a black~~ color, ornamented with bright red, and has been observed once or twice preying on the small caterpillars feeding on the *Asclepias*, or milk-weed.

Another species, *Lygæus fasciatus*, (Fig. 22,) of an orange and black color, has also been found in great abundance in Maryland on flowers of the *Asclepias* in company with caterpillars of *Euchetes egle*, a medium-sized moth, or miller, and it probably feeds also upon them.

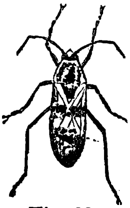


Fig. 22.

Lygæus bicrucis, (Fig. 23,) a plant-bug of a bright-red and black color, with white edges on the elytra and thorax, was taken under bark in winter, showing that this class of insects hibernates in the perfect state in sheltered situations.

These three examples will suffice to show the general form of the genus *Lygæus* in this country.

Fig. 23.

Ophthalmicus (Fig. 24) is figured merely to show the singularly broad head and projecting eyes of one genus of the *Infericornes*, and so different from the rest. Most probably it is a plant-feeder.

Nysius raphanus (Fig. 25) is a small plant-bug of a brownish color when dried, injurious to radishes, mustard, grape, cabbage, potatoes, and cruciferous plants. There are two or three broods annually in some of the States. The insect has a very disagreeable smell, and sucks the sap of plants, causing them to wilt. The leaves attacked show little rusty circular specks, where the beak has been inserted, which form little irregular holes that look more as if caused by a coleopterous insect, the common flea-beetle.

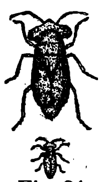


Fig. 24.

We now come to the most destructive insect of the whole family, the chinch-bug.

The chinch-bug or Mormon louse of Walsh, *Micropus* (*Rhyparochromus devastator*,) (*Micropus*) (*Blissus*) *leucopterus*, (Fig. 26,) is one of our most destructive insects ~~to~~ wheat, corn, &c., in some of the Western States, and has done considerable damage to the crops. The eggs, to the number of about 500, are laid in the ground about June, on or among the roots of plants; and the young larvæ, which are of a bright-red color, are said to remain underground some time after they are hatched, sucking the sap from the roots, and have been found in great abundance at the depth of an inch or more. The full-grown insects measure about one-twelfth of an inch in length, and are of a black color, with white wings, and may be known by the white fore or upper wings, contrasting with a black spot in the middle of the edge of the wing.

Fig. 25.

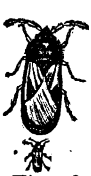


Fig. 26.

According to Dr. Shimer, an entomologist who has devoted much time and labor in the special study of this insect, the female occupies about twenty days in laying her eggs, which remain in the egg state fifteen days. The first brood matures from mid-July to mid-August, and the second brood hatches out late in summer. Although only two generations are usually produced in the course of one year in Illinois and the more Northern States, yet farther south there may be three broods. Some of the perfect insects continue alive throughout the winter, concealed under brush-heaps, logs, bark, stones, moss, &c., and revive in the spring to deposit their eggs in the earth. One specimen was taken in Washington, buried in the ground at a depth of about one inch and a half, in midwinter, and when first taken up appeared stiff and lifeless; but, after being placed in a warm room, it soon revived, and was as lively as ever. These insects in the larva, pupa, and perfect states attack and destroy

almost every description of garden-vegetables, grain, maize, herbs and other grasses, wheat, oats, potatoes, and even injure buds of the pear and other trees, preferring principally the most succulent parts, as the buds and terminal shoots, puncturing them with their beaks, sucking the sap, and apparently poisoning the parts attached. In the summer of 1865, according to Dr. Shimer, the progeny of the broods of the preceding year were entirely swept off by an epidemic disease, which was doubtless produced by deficient light and electricity combined with the excessive humidity of the atmosphere.

This insect was named and described by Say, in 1831, as from Indiana, and in 1854 did considerable injury in Missouri. In hot, dry seasons, these insects are most destructive; but heavy rains destroy them. In the single State of Illinois, Dr. Shimer estimated the damage done in 1864 to the wheat and corn crops by the chinch-bug at over $73,000,000; and to give some idea of how these insects swarm in localities, it has been stated that in Ogle County, Illinois, as many as thirty to forty bushels a day were taken out of holes dug to entrap them, and the process was repeated until only three or four bushels could be shoveled out of the holes.

It is probable that the normal state of this insect is to take wing in spring and summer, during their love season, but at other times they appear unwilling to use their wings at all; and it is said that there are two varieties, one with long and the other with short wings. It is also stated that this insect is found in Canada, and is remarkable for having the wings only half as long as the abdomen. Chinch-bugs multiply much faster in dry seasons; wet weather being unfavorable to them. They are destroyed by several parasites, among which are several species of lady-bugs, (*Coccinellidæ.*)


Fig. 27.

The false chinch-bug, (Fig. 27,) an insect mentioned below, and which, in outward appearance, very much resembles the true chinch-bug, is said to kill it; two or three lace-wing flies are also said to destroy it. The common quail is stated to eat numbers of them, and therefore these birds should be preserved as much as possible, by wheat-growers especially, as the stomachs of some shot in wheat-fields were found to be filled with these destructive pests. The pseudo or false chinch-bug, or insidious flower-bug, above mentioned, has frequently been mistaken for the true chinch, as it resembles it somewhat in shape and size. It is found upon the same flowers and leaves, but the larvæ are of a bright-orange color, and not of a vivid red, like those of the true chinch; and the perfect insect is also smaller, of a broader form, and marked in a different manner. It is probably highly beneficial by feeding on other insects. Two European species, *A. minutus* and *nemorum*, have been well known as preying on plant-lice. The perfect insects inhabit flowers, and the immature ones wander about in search of plant-lice, which they transfix with their sharp beaks, and suck out the juices. Our native species (*Anthocoris* (*Triphleps*) *insidiosus*) most probably also feeds on the true chinch and the grape-leaf gall-louse, (*Pemphigus vitifoliæ.*) This insect is extremely common in Maryland on the ox-eyd daisy, and not unfrequently upon the fruit of raspberries and blackberries, and is one of the insects which produce such a disagreeable chinchy taste when taken into the mouth with the fruit.

The plant-bugs in the fourth family, *Cecigenæ*, are destitute of ocelli (hence named) and frequent plants, shrubs, &c.

Largus succinctus (Fig. 28) is not a very uncommon insect in Maryland, of a rusty-black color, with the borders of the upper wings edged with dull orange or yellow. We have found this insect hibernating under moss, stones, or bark, in midwinter in Maryland, but have never yet caught it in the act of injuring plants, although it probably is a vegetable-feeder.

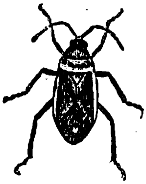


Fig. 28.

Another plant-bug of this family, *Dysdercus* (*Pyrrhocoris*) *suturellus*, (Fig. 29,) is the too well-known red bug, or cotton-stainer, of Florida, which some seasons does so much injury to the cotton fiber in the bolls of the plant, when in the field, by sucking out the sap from the boll and seed, and voiding an excrementitious matter over the opened bolls, which produces an indelible stain on the fiber and renders it unfit for market. The cotton-stainer, or red bug, is of a bright scarlet-crimson color, with a mark like a Saint Andrew's cross on its upper wings, and the rings of the abdomen are of a whitish or cream color. The young are also red or bright crimson, with black dots and white rings; are very active and voracious. The eggs, to the number of 20 or 30, are deposited on the leaves or stalks of the cotton-plant, (*Gossypium.*) When young, the larvæ gather together; but, when older, they separate, and spread themselves over the plant. The larvæ, pupæ, and perfect insects all suck the sap from the plants and bolls, after puncturing them with their rostrum, or beak; thus causing the young bolls to become diminutive and weak. The principal injury, however, is caused by the insects, after sucking the juices of the seeds and bolls, voiding an excrementitious yellowish liquid over the cotton, in the opening or open boll, which stains the pure white cotton fiber yellowish or reddish in spots; and these stains, being indelible, very much depreciate the market-value of the cotton. It was thought at one time, from its beautiful red color, that this insect might be made useful in producing a brilliant red dyeing-material; but Dr. Jackson, of Boston, to whom specimens were sent in order to test its coloring matter, wrote that "no red color could be extracted from them; but that a rich yellow or ochraceous yellow lake was made, which is readily fixed on woolen or silken fabrics, and that the coloring matter would also serve as a yellow basis for green or brown dyes." This insect has also been mentioned as staining cotton on Crooked Island, one of the Bahamas, so much as to render it of little or no value. These insects being in the habit of collecting together where there were splinters or fragments of sugar-cane on the ground, advantage was taken of this fact to draw them together by means of small chips of sugar-cane laid upon the earth near the plants, where they were at once destroyed by means of boiling water. They also collect around heaps of cotton-seed, where they may readily be destroyed at the commencement of cold weather. Small heaps of refuse trash, dried corn-stalks, or especially of crushed sugar-cane, may be made in various parts of the plantation in the vicinity of the plants: under these, the insects take shelter from the cold; and when a sufficient quantity of the bugs are thus drawn together, the various heaps may be fired, and the insects destroyed with the trash. A very cold morning, however, should be selected, and the

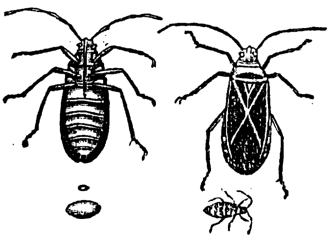


Fig. 29.

fire made before the insects have been thawed into life and vigor by the heat of the sun; and especially all dead trees, rotten stumps, and weeds in the vicinity of the field should be burned or otherwise destroyed, as they afford a comfortable shelter for all sorts of noxious insects, in which they can pass the winter in a semi-dormant condition. Crushed sugar-cane (bagasse) mixed with some poison, (say Paris green,) if imbibed by these insects, would, no doubt, destroy many of them, but might also be taken by domestic poultry, or hogs.

The fifth family, Bicelluli, contains plant-bugs having two basal cells in the membrane of the wing. The last joint of the antennæ is very fine and setiform.

The group Capsides contains insects of active habits. The females have ovipositors nearly half the length of their bodies, somewhat saber-shaped, and received in a slit on the under side of the abdomen. These small plant-bugs are very active, running and flying with agility. They frequent plants, trees, and fruits, upon the juices of which they appear almost exclusively to subsist. Some of the species are especially fond of fruit, such as raspberries, which they suck with their rostrum and impart a very nauseous taste to the fruit.

An exception to their general plant-feeding habits, however, is shown in one species, *Campyloneura* (*Capsus*) *vitripennis*, (Fig. 30,) or the glassy-winged soldier-bug of Riley, which is said to be beneficial by destroying the leaf-hoppers of the vine-leaf, *Erythroneura vitis*, (incorrectly called the thrips.) The insect is of a pale greenish-yellow, the head and thorax are tinged with pink, and the upper wings are transparent, with a rose-colored cross. It lives also on the wild chicken-grape, and attains its full growth in August, and destroys small caterpillars by thrusting its beak in their body and sucking their juices, according to Professor Uhler. Most probably many other species of the *Capsides*, hitherto considered as plant-feeders, also occasionally vary their diet by sucking out the juices of other insects.

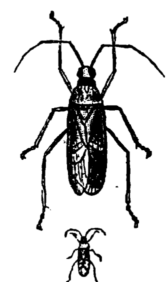


Fig. 30.


Fig. 31.

As the Capsides in general are very injurious to vegetables, as well as numerous, we will give a few figures of them in order to give the student some general idea of their size and form.

Resthenia (*Capsus*) *confraterna* (Fig. 31) is of a black color, with red thorax, and is somewhat common on weeds and low herbage. It is very active, either running swiftly away and hiding, or flying away when disturbed.

Calocoris (*Capsus*) *bimaculatus* (Fig. 32) is also a common insect of a green and brown color, and is very common in Maryland on weeds.

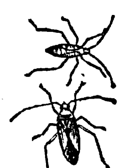


Fig. 32.

Lygus lineatus (*Capsus* and *Phytocoris quadrivittatus*,) (Fig. 33,) or the four-striped plant-bug, is a very common insect in Maryland, and is of a green or yellowish color, with four black lines on its wing-covers. The female, when dissected by Dr. Le Baron, was found to contain 14 to 24 oblong, cylindrical, flask-shaped eggs. Larvæ, pupæ, and perfect insects puncture leaves, abstract the sap, and produce a blighted appearance of the foliage of currants, parsnips, potatoes, mint, weigelia, dietzia, &c.; sometimes causing them to wither up entirely.


Fig. 33.

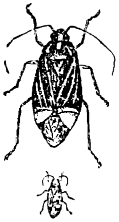


Fig. 34.

One of the most common small plant-bugs in Maryland is *Lygus lineolaris* (*Capsus oblineatus* Say,) (Fig. 34,) or little lined plant-bug of Harris. This insect is of a black and brownish yellow color, and is very common on almost all kinds of plants. It appears in April, but is more abundant during the summer, when it injures plants by sucking their sap. The punctures made by them appear to be poisonous to vegetation. This insect injures pear-twigs, and the stalks of grape-vines, potatoes, strawberries, fruit-trees, such as quinces, &c., and is very fond of congregating on the flowers of cabbage. It is stated to have injured the crops in Illinois very considerably. Dr. Le Baron says that it destroys the Colorado potato-beetle, and the American Entomologist reports it as destroying the eggs of other insects as an offset to the great amount of damage it does to the crops. It has been found in the perfect state in winter.

The sixth family, *Ductirostri*, contains plant-bugs, which, when at rest, have their beaks, or piercers, in a groove, or duct, under the body.

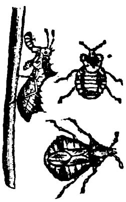


Fig. 35.

The first group contains a singular, small, greenish insect, marked with brown, *Phymata* (*Syrtis*) *erosa*, (Fig. 35,) having raptorial, crooked, sickle-shaped fore feet, with which it catches and holds its prey while it leisurely sucks out the juices. This insect stings severely: it lies in wait in flowers or among leaves, where, hidden from observation by the similarity of its color to the places it frequents, it seizes any unfortunate insects that may happen to alight near its hiding-place. One of these insects was taken in the very act of sucking out the juices of a small blue butterfly; the bug itself being completely concealed among the petals of a rose, the butterfly only appearing in sight, which was seized as a specimen and drawn out, with the bug still clinging to it. Many other bugs of the same species were afterward observed lying in wait in various flowers for any roving insects that might be attracted to them. It is said to prey on small bees and wasps, and also is beneficial by destroying plant-lice, or *Aphides*.

The group *Tingides* are small, flattened, singularly-formed insects, living on various plants and trees.

A good example of this group is *Tingis juglandis*, an insect found abundantly on the butternut, birch, and willow, where it pierces the leaves and sucks the sap. This insect resembles a flake of white froth; its whole upper surface being composed of a net-work of small cells, with an inflated egg-shaped protuberance like a small bladder on the top of the head and thorax. The wing-covers are square, with rounded corners.

Tingis arcuatus (Fig. 36) is distinguished by the arcuated edge of the hemelytra, or wing-covers, with brown bands. They live on the sap of plants and trees, and one species closely related to it was found on the quince-bushes in Mississippi and Florida, where the bushes were literally swarming with them in all stages, as larvæ, pupæ, and perfect insects, and some of the trees were very much injured, if not totally destroyed by them. They were also very troublesome to mankind by their stinging propensities.

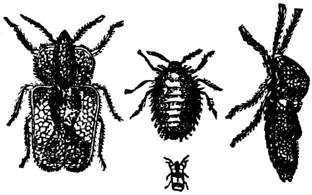


Fig. 36.

Aradus americanus, (Fig. 37,) a small, flat, brown or blackish bug, is very common under bark of trees.

Insects of the group Aradides have the beak longer than the head. The prothorax is widely expanded, and wing-covers are rounded at the base. The species are said to feed on minute fungi found under bark.

Fig. 37.

We now come to that pest of neat house-keepers and torment of weary travelers, the bed-bug, *Acanthia lectularia*, (*Cimex lectularius*,) (Fig. 38.) Wedwood states, "It is generally asserted that this insect was brought over to England from America, whence it passed over to the continent of Europe, and that it was not known in England until 1670." Mouffet, however, mentions its having been seen in 1503. Leunis states that they probably originated in the East Indies, and says, "It is a historical fact that they first appeared at Strasburg in the eleventh century," and that they were first imported into London in the bedsteads of the banished Huguenots. Verrill states that this insect is mentioned by Pliny, Aristophanes, Aristotle, and other ancient writers; and, although it was seen by Mouffet in 1503 in England, it does not appear to have been common there until a century later. The eggs are white, oval, slightly narrowed at one end, and terminated by a cap, which breaks off when the young escape. The young ones at first are very small, white, and transparent. It takes eleven weeks before they attain their full growth, and they are said to cast their skins several times before attaining maturity. It is probable, however, that the temperature and food have much influence in accelerating or delaying their final change into the full-grown imago, or perfect insect. The insects are gregarious in habits, and herd together in cracks and chinks, in corners of bedsteads, &c. Professor Verrill states they return constantly to the same hiding-places morning after morning, like birds returning to their roosts. These insects are very tenacious of life, and have been kept in hermetically-sealed glass bottles for more than a year without food, and were yet lively, and had a good appetite. Leunis mentions an instance where a female bed-bug lived for six months in a tightly-closed box, which, when opened, was found to contain not only the mother, but also her numerous progeny of young bugs, both mother and offspring being as transparent as glass from want of food. They hibernate in cracks and crevices of the walls, floor, or in furniture. Leunis states that the female lays about fifty eggs, and that the principal months for oviposition (in Europe) are March, May, July, and September; but that the September brood perish, and only the fully-matured insects are able to survive the cold of winter. Their food consists of blood, and they are very troublesome to mankind. Bats, swallows, pigeons, domestic fowls, &c., are said to be very much infested by bed-bugs; probably, however, of different species from our common house bed-bug. These insects, although apterous, are said to have been seen with wings; but this probably is an error, as some other insects, *Xylocoris domesticus*, &c., &c., have been mistaken for them. They are likewise reported to have been found under bark of trees in the woods and fields; but Mr. Walsh has never found them in such situations, and thinks that a small beetle, *Prometopia sexmaculata*, (or *Aradus*,) has been mistaken for the bed-bug, as it inhabits such localities. Bed-bugs are destroyed by several other insects, such as cockroaches, (*Blattidæ*,) and by other heteropterous insects, as *Reduvius personatus*, and probably by *Pirates biguttatus* and *Conorhinus* (*sanguisuga*) *variegatus*.

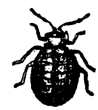


Fig. 38.

The seventh family, Nudirostri, contains bugs having the beak or piercer naked or free, entirely disengaged, and not in any duct, as in the

last family. The habits of most of them are raptorial, preying upon other insects, and as such they are generally beneficial to the farmer.

Pirates biguttatus, (Fig. 39,) sometimes called the spotted corsair, is a large, slowly-moving bug of a blackish color, with legs, antennæ, and markings on wing-covers of a dull orange color, with two spots on the wing-covers, and is said to be carnivorous, destroying other insects, and probably destroys bed-bugs also, as one was found between the mattresses of a bug-infested bed, and the insect itself is closely allied to *Reduvius personatus*, mentioned below, which is known to feed upon bed-bugs.

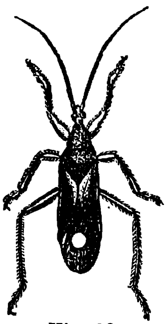


Fig. 39.

Reduvius personatus (Fig. 40) is a brownish bug, not rare in Europe in houses, where it is generally found dead and hanging in spiders' webs. Burmeister says that the spiders do not seize it, as its puncture is very poisonous, but let it encumber their webs until it dies of hunger. The insect is stated to exhale a disagreeable odor, something like that of mice. It hibernates without taking any food, when its body becomes meager and flat; but, on the return of fine weather, it recovers from its lethargy, and commences to hunt for such insects as form its prey. The larvæ and pupæ cover themselves with a mask or coating of dust and dirt even to the legs and antennæ, and so disguise themselves as scarcely to be distinguished from the places they frequent, and prey upon the common bed-bugs. It is said that the larva is covered with a glutinous substance, to which the particles of dust adhere; and, when hunting for its prey, it moves in a very leisurely manner, so as not to disturb them. In regard to the covering of dust and dirt, already alluded to, M. Brulle says that a specimen shut up by him, which had undergone one of its moultings, during its imprisonment divested its old skin of its coat of dust in order to reclothe itself again therewith. Douglas says it is found occasionally in dwellings and fowl-houses, and flies at night to lights in windows. An insect very similar to the larva as described was found in a discarded insect-box, but it unfortunately escaped before attaining the imago or perfect state. Another was also captured in Washington, in midwinter, in 1876.

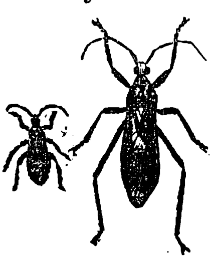


Fig. 40.

The nine-pronged wheel-bug, or devil's-horse, *Prionotus cristatus*, (*Reduvius novenarius*,) is very common in Washington, and is very destructive to insects; and as horticulturists are very apt to clear their trees in spring of eggs, cocoons, &c., of insects, imagining that they are all injurious to vegetation, it will be well to warn them that some species are beneficial, by destroying injurious insects, and their clusters of eggs should be preserved wherever found. Among these, a hexagonal mass of eggs will frequently be met with, cemented together with a species of gum or resin, which is said to be gathered from the tree by the female. This insect is commonly known in Maryland by the name of devil's-horse, or nine-pronged wheel-bug, *Prionotus cristatus* of Linn., or *Reduvius novenarius* of Say, (Fig. 41.) These hexagonal masses of eggs are deposited on the bark of trees, on fence-rails, under the eaves of out-buildings, or wherever the female chances to be at the time of oviposition, to the number of 70 or more; each egg, when separated from the mass, presenting the appearance of a somewhat square flask standing on its own bottom. The larvæ when young are blood-red, with black marks, and do not resemble the adult insect, excepting somewhat in form and

habits. The larvæ, pupæ, and perfect insects feed upon all other insects they can overcome, not even sparing their own brethren. When very young, they destroy great numbers of plant-lice, *Aphides*, and when older, they prey upon caterpillars, or indeed upon any other insect they can overpower. They kill their prey by inserting into it the proboscis, which ejects a most powerful poisonous liquid into the wound. The

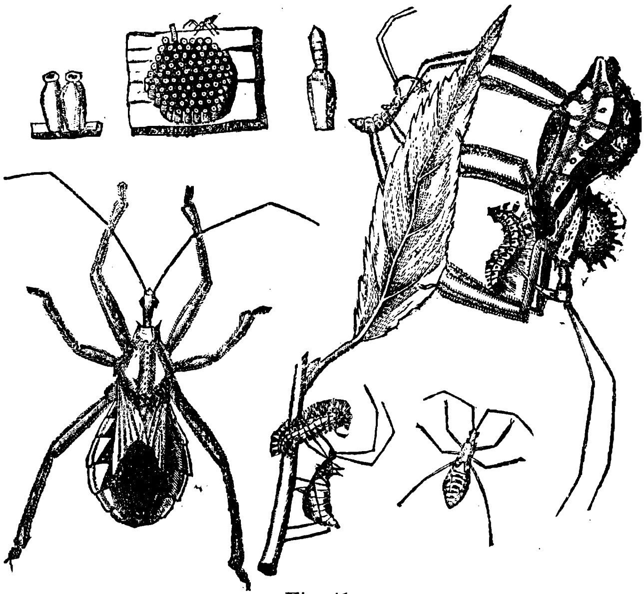


Fig. 41.

victim thus pierced dies in a very short time. They then leisurely suck the juices out, and drop the empty skin. The perfect wheel-bug is a large and very singular-looking insect, of very slow and deliberate motions when undisturbed, and stealing up to its prey. It is of a gray color, and has a high semicircular ridge or projection on the crest of its thorax, armed with nine perfectly-arranged teeth, or cog-like protuberances, like very short spokes or cogs of a wheel; hence the vulgar name of wheel-bug. The young shed their skins several times before attaining their full size. As this insect is constantly employed, from the moment it is hatched, in searching for and destroying noxious insects, it may be considered a friend to the horticulturist and farmer. A dozen or so of these insects, placed near the nest of some of those caterpillars so destructive to our fruit and forest trees, will destroy almost every caterpillar in it in a short time, as they are exceedingly voracious, and each insect will destroy several caterpillars daily. Great care must be taken, however, when handling the adult insects, as they are very apt to sting, or rather insert their strong curved beaks into the naked flesh, and the poisonous fluid ejected, when the wound is inflicted, is extremely powerful, and much more painful than the sting of a large wasp or hornet. One of these insects having stung the writer, the pain lasted for several hours, and was only alleviated by applications of ammonia. Several days afterward the flesh immediately surrounding the puncture was so much poisoned that it sloughed off, leaving a small hole in the injured thumb.

Melanolestes (*Pirates*) *picipes*, (Fig. 42,) a medium-sized black bug, is said by Walsh to be found underground, where no doubt it feeds on subterranean insects. In Maryland, it is found under stones, moss, logs of wood, &c., and is capable of inflicting a severe wound with its rostrum, or piercer. It feeds on other insects, and is slow and deliberate in its motions. *M. abdominalis* is distinguished by its red abdomen, which generally shows on each side of the wing-covers.

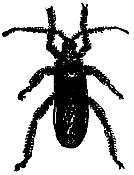


Fig. 42.

Apiomerus (*Reduvius*) *spissipes*, (Fig. 43,) a carnivorous plant-bug of a brown color, with light-yellowish markings, is known as a destroyer of insects, and has also been reported to the Department as killing honey-bees. These insects when in their search for prey are very slow and cautious in their movements, as if they were aware that any rapid or sudden motion would frighten their victim away.

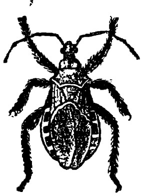


Fig. 43.

Milyas (*Harpactor*) *cinctus* (Fig. 44) is a medium-sized raptorial bug, with a spine on each side of its thorax, and is of a yellowish-brown color, with mottled or banded legs. It is not rare in the neighborhood of Washington. It feeds upon all insects it can overcome, and is therefore very useful as an insect-destroyer. It has been reported as destroying the too well-known Colorado potato-beetle, *Doryphora decemlineata*, and also the small caterpillars of the apple-worm, or *Tortrix*.

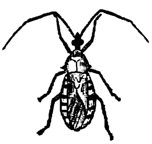


Fig. 44.

Sinea multispinosa, (Fig. 45,) so named from its prickly or spiny appearance, somewhat resembles the last-named insect in general appearance and habits. It is of a brownish color, and wanders about on plants and shrubs, seeking what insects it can overcome, and has also been reported as killing the larvæ of the above-mentioned Colorado potato-beetle. It also is very useful by destroying the *Aphides*, or plant-lice, and other insects.

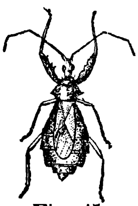


Fig. 45.

Eotrichodia cruciata, (Fig. 46,) a carnivorous plant-bug, of a black and scarlet or orange color, is somewhat rare near the Maryland Agricultural College, and has the same habits and propensities as the *Reduvius*. It kills all the insects it meets in its wanderings, and sucks out their juices.

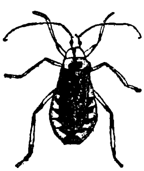


Fig. 46.

Hammatocerus (*Nabis*) *furcis* (Fig. 47) is a very large and powerful predatory plant-bug, of a black and orange or yellowish red, with the upper part of the wing-covers of a yellow color. It has much the same habits as the nine-pronged wheel-bug, *Prionotus cristatus*.

Almost all the raptorial or predatory plant-bugs resemble the carnivoræ, or cat-tribe, of the larger animals; being watchful, cautious, stealing slowly step by step upon their prey, and having strong blood-sucking propensities. No doubt, they do much good by destroying insects injurious to our crops.

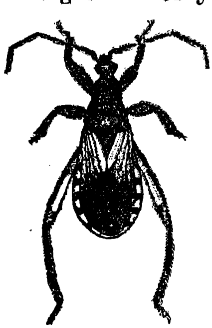


Fig. 47.

A large and powerful carnivorous plant-bug, also of a black and red or orange color, closely related to the last-named insect, is accused of sucking the blood of mankind, and is generally known as the blood-sucking cone-nose, from the form of the anterior part of its head, or the big bed-bug, and so called to distinguish it from its smaller relative, the well-known bed-bug. The

scientific name is *Conorhinus* (*Sanguisuga*) *variegatus*, (Fig. 48.) This insect insinuates itself into beds in the Middle and Southern States, and sucks the blood of mankind, causing great pain and inflammation. It hibernates in the pupa and perfect state, and is stated to feed not only on human blood, but also the insect that causes the blood to flow, namely, the common bed-bug, (*Acanthia lectularia.*) From its blood-sucking propensities, there is very little doubt but what it also destroys insects.

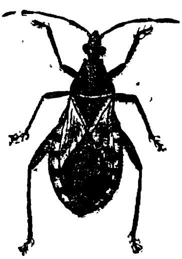


Fig. 48.

A much slighter-formed raptorial plant-bug, with longer and slimmer legs, and also of a black and red or orange color, called *Evagorus rubidus*, (Fig. 49,) preys upon other insects, and was found to be very useful in destroying the myriads of plant-lice upon the orange-trees near Palatka, Fla.

Diplodus luridus (*Evagorus viridis*) (Fig. 50) is a slender insect, somewhat related to the last-mentioned species, the larva of which is very common on fruit-trees. It is said to be wingless, and covered with a glutinous substance, to which little pieces of dust and dirt are commonly seen to adhere. The perfect insect is winged, and said to destroy the plum-curculio, (*Conotrachelus nenuphar.*)

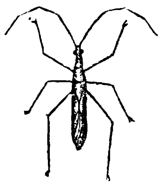


Fig. 50.

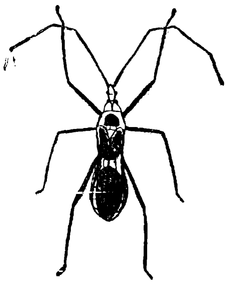


Fig. 49.

Ploiaria vagabunda (Fig. 51) is a very slender plant-bug. It has very short anterior legs, or rather arms, while the two posterior pairs are very long. When walking, it moves very slowly, with its fore legs (which are perhaps useful in climbing or to seize its prey) applied to its body, while the antennæ being bent at the extremity, which is rather thick, are made to rest upon the surface on which the insect moves, and to supply the place of fore legs. The insect is found on trees; it vacillates or trembles, and balances itself continually like a *Tipula*, or long-legged crane-fly. De Geer says it is found in houses, and walks slowly but flies easily and quickly. Burmeister states that the larva covers itself with dust and lives on prey. In England, the insect lives in thatch.

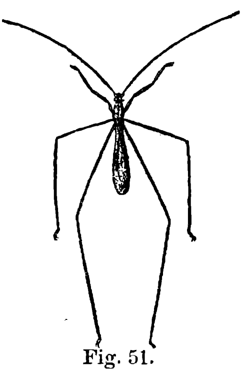


Fig. 51.

Emesa longipes (*brevipennis* of Say) (Fig. 52) is an exceedingly thin and slender carnivorous plant-bug. These insects feed on other insects, and resemble the thinnest bits of sticks fastened together. The antennæ are long and delicate. The fore legs are raptorial, with long, thin coxæ, admirably adapted for seizing and holding their prey, which consists of other insects. The body is long and thin; the wings are either wanting (in some species) or reach only to

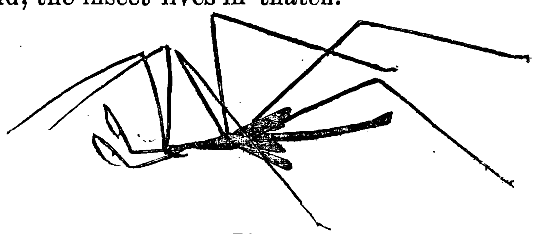


Fig. 52.

near the middle of the abdomen. This insect is very common in some localities, inhabiting outhouses, where it generally is found motionless on the walls; when disturbed, it raises and lowers its body on its legs, at the same time moving forward. Professor Uhler states that this insect within the last five years has appeared near Baltimore on small pine-trees, and is now widely distributed in the country. The distinguishing feature of this singular insect is the raptorial structure of the small fore legs, resembling those of the *Mantidæ*, or what are generally known in Maryland as rear-horses.

The eighth family of the *Heteroptera* contains those insects that row on the surface of the water, hence the name *Ploteres*, or rowers; their four hind feet being formed for gliding on the surface of the water, and are sometimes erroneously called in Maryland water-boatmen, (see *Notonecta.*) These insects are very active, and skim the surface of the water with great velocity. When gliding over streams and ponds, their hind feet act conjointly as a rudder, and the longer middle feet are used somewhat as oars, not dipped into, but merely brushing over, the surface. They feed on other insects, and in Europe the eggs are said to be destroyed by a species of *Teleas*, (*Hymenoptera.*)

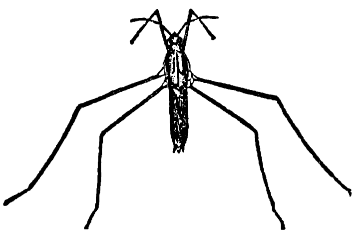


Fig. 53.

The insect of *Gerris conformis* (Fig. 53) was taken in Maryland on the surface of slowly-running water in the act of devouring a dead fly, which was floating on the surface.

Gerris lacustris (Fig. 54) is a smaller species, also common in Maryland on the surface of water, and alsofeeds on other insects.

The second section of the suborder *Heteroptera*, *Hydrocorisæ*, contains only three families, viz: Family 1, (or 9,) *Bigemmi*, bugs having two ocelli; family 2, (or 10,) *Pedirapti*, water-bugs having raptorial fore legs for seizing and holding their prey; and family 3, (or 11,) *Rediremi*, water-bugs having their posterior tarsi generally like oars, and formed for swimming and diving; the anterior feet are not raptorial.

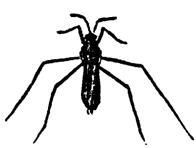


Fig. 54.

Galgulus oculatus (Fig. 55) is a representative of the group *Galgulides.* These insects have broad heads, with peduncled eyes; their antennæ are four-jointed, but concealed beneath the eyes; the ocelli are present; the body is short, broad, and flattened, and the legs are formed for running. These insects, at the first glance, resemble miniature toads. They are probably predatory in habits, preying on other insects, and appear to form a link between the aquatic and terrestrial species.


Fig. 55.

Galgulus oculatus was taken in Maryland running on the sand near a swift stream. One authority states that they feed on *Hya terminalis*, (see in *Orthoptera*,) but this fact is somewhat dubious.

Family 2, (or 10,) *Pedirapti*, contains two groups, *Naucorides* and *Nepides.*

Naucoris poeyi (Fig. 56) is a rather small, yellowish-brown water-bug, with two raptorial fore feet and four hind feet, which the insect uses for walking in the water and running, although they are not ciliated. These insects frequently leave the water during the night to scour round the country. The eggs are said to be glued to the blades of leaves or water-plants in April, and the bugs feed on all the insects they can capture when in the water.


Fig. 56.

Group 2, *Nepides*, contains water-bugs with depressed body, head small, eyes large and lateral, and the fore legs strongly raptorial; the other two pairs being formed for creeping among the roots of aquatic plants, and the extremity of the body is furnished with two long and slender filaments. The eggs of these insects are deposited in the water; they are said to be oval in form, and surmounted by seven elongated filaments, which serve, whilst the egg is in the oviduct, to form a kind of cup for the reception of the next egg, but which are recurved when the egg is discharged. These insects are not lively, and drag themselves along at the bottom of the water. When in a vase, they are carnivorous, not sparing even their own species. They seize their prey between the shank and the tarsi, which they fold under the thigh, and retain it in this manner while they suck out its juices. This insect living in the water is compelled to resort to the surface continually in order to obtain a fresh supply of air, which it does with the assistance of the two appendages at the extremity of its body, which conduct the air to the two spiracles at the side of the anus, (Westwood.)

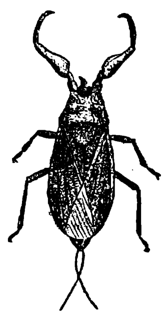


Fig. 57.

Nepa apiculata, or the water-scorpion, (Fig. 57,) is a good example of this group. It feeds upon other insects, and also most probably on small fishes. Kirby and Spence state that a *Nepa*, put into a basin of water with several young tadpoles, killed them all without attempting to eat them. It is therefore very evident that they will destroy young fish, and should be extirpated in or near any fish-breeding establishment.

Another singularly-formed, large, brownish-gray water-bug of the family *Pedirapti* is *Ranatra quadridenticulata*, (Fig. 58.) The body is of an elongated form, with a double tube at the end for respiration; the eyes are prominent; the two fore legs are raptorial; the four other legs are long and slender, and the prothorax is greatly elongated. These insects living in the water are compelled to come to the surface for air, which they obtain with the assistance of the before-mentioned two appendages placed at the end of the anus, (Westwood.) The eggs are longer than those of *Nepa*, and furnished above with slender setæ, or bristles. Roesel states that these eggs are deposited at random in the water; but Geoffroy and Amyot state that they are introduced into the stalks or blades of aquatic plants, the elongated filaments alone being exposed. They are very voracious, feeding on other insects, aquatic larvæ, and small fish. They fly from pond to pond in the evening or at night, especially when the waters begin to dry up. These insects are mostly found at the bottom of stagnant water, as they swim badly. Westwood mentions a European species which is said to carry, attached to their feet, very small grains of a lively-red color, which are surmised to be the eggs of an aquatic mite.

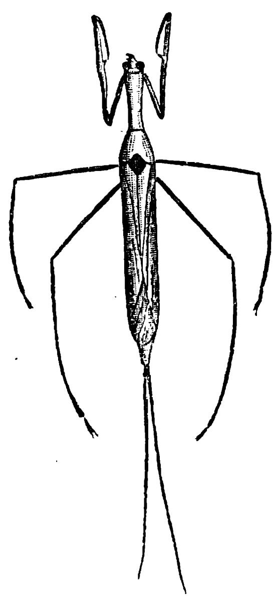


Fig. 58.

Belostoma is one of the largest water-bugs belonging to the family *Pedirapti;* some species measuring three to four and a half inches

in length. They live principally in the water, but come out occasionally in the evening or at night, and take long flights. The form of this insect is elliptical-oval; the fore tarsi of the adult are two-jointed, with a single claw; the hinder are broad and flat. Their habits are predaceous, and they feed on aquatic larvæ, insects, young fish, and probably also on the fish-eggs. The females of some species, *Serphus* (*Zaitha*) *dilatatus*, &c., (Fig. 59,) carry their eggs upon their backs, arranging them with great symmetry in a single layer, (Westwood.) Other species deposit their smooth cylindrical eggs, which are about the sixteenth part of an inch in length, in a mass of about 90 eggs, under logs just at (but not above) the surface of the water. These eggs are attached by the posterior end to a mass of silk gum. They partially overlap each other, and the young escape by a round lid.

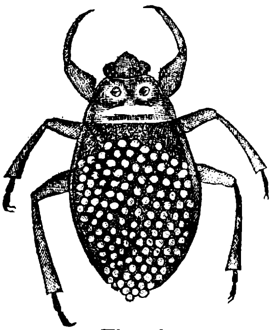


Fig. 59.

Belostoma americana (Fig. 60) is one of our largest species, and feeds on aquatic insects and small fishes. A medium-sized gold-fish in the aquarium of the Department was killed by one of these insects the first night it was introduced as a companion to the fish; thus proving conclusively that they are injurious, and should therefore be destroyed when and wherever found in the neighborhood of fish-breeding establishments. The perfect insects sometimes leave the ponds and fly to long distances and at a considerable height; one living specimen having been taken early in the morning on the roof of a three and a half or four story building, where it had flown during the night, and the nearest pond was nearly a quarter of a mile distant.

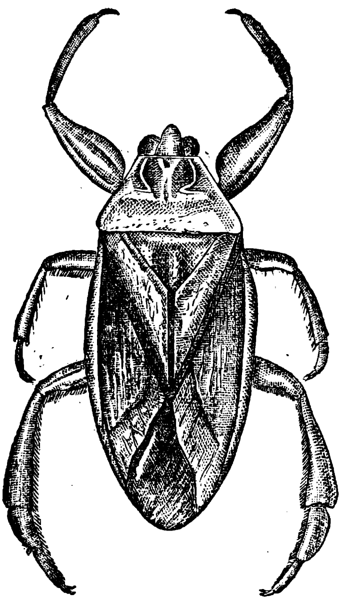


Fig. 60.

Family 3 (or 11) of the *Hydrocorisæ*, or water-bugs, contains the *Pediremi*, or oar-footed water-bugs. In this family, the posterior tarsi are generally in the form of oars and the anterior feet are *not* raptorial. There are two groups, *Corisides* and *Notonectides*. In the *Coriside* (Amyot) the prothorax is large, and covers the mesothorax; the fore tarsi are single-jointed, flattened, and strongly ciliated and imperfectly prehensile; the mid legs are slender, with remarkably long and slender claws; the hind legs have the two tarsal joints very broad, ciliated, and adapted for swimming. The insects frequent pools; their motions are rapid in water; they dive when disturbed, and seize hold of submerged objects with their middle pair of legs. They also fly well, but walk with difficulty. These insects are frequently found at the surface of the water beneath the ice when frozen.

Fig. 61.

Corixa (Geof.) (*Corisa* (Amyot) *interrupta*) (Fig. 61) is not uncommon in pools of water at Fishkill Landing on the Hudson, where they have been taken from under the ice in winter,

and thawed out into life and activity, after being apparently frozen to death. This insect differs from the following (*Notonecta*) by swimming on its belly and not on the back. When resting quietly on the water, the posterior feet are advanced forward (as in the figure) and pass the intermediate feet, so that what are really the posterior feet are apparently the anterior. This insect ordinarily suspends itself by its tail to the surface of the water; but, at the least movement, it precipitates itself quickly to the bottom, where it remains resting some time, clinging to a plant or stone with its long and slender middle legs. The insect walks with difficulty upon the ground; and, when in a globe or aquarium, and diving, the under part of their bodies appears silvery, which is caused by the air attaching itself and remaining clinging to the body under water. They are said to exhale an offensive odor like that of a bed-bug, and are carnivorous, living on other insects. In Mexico, the eggs of *Corixa femorata* or *mercenaria* are used as food. "The eggs of this insect are said to be gathered from water-plants, and are used as an article of food by the dwellers near the lakes where they abound. The natives cultivate, in the lagoon of Chalco, a sort of carex called 'toulé,' (or tulé,) on which the insects deposit their eggs very freely. This carex is made into bundles, which are removed to Lake Texcuco, and floated in the water until covered with eggs. The bundles are then taken out, dried, and beaten over a large cloth. The eggs, being then disengaged, are cleaned and pounded into flour." Of *Corixa mercenaria*, (vol. 1, p. 367,) Say says, "Passing through the market in the city of Mexico, I obtained a few specimens from a quantity of at least a peck, exposed for sale by an Aztec woman, where they are made use of as food," (not specifying whether it was the eggs only, or the insects themselves.) Mons. Guerin Meneville presented some bottles filled with both the eggs and insects to the Department of Agriculture a few years ago.

The group *Notonectides* contains some medium-sized water-bugs, with somewhat angularly roof-shaped bodies, uniform, and hairy beneath; the fore tarsi are three-jointed, and the hind legs very long and formed for swimming and diving. These insects swim very rapidly with the back downward, using their legs as oars; hence their common name of water-boatmen. The eggs are white and elongated, and are said by Roesel to be attached to the stems and leaves of aquatic plants, and are hatched in about fifteen days. These insects, living in water, are obliged to come to the surface in order to obtain air. In doing this, the extremity of the body is thrust out of water, whereby a supply of air is introduced beneath the wings and the upper surface of the abdomen, where it is retained by rows of hairs, with which the segments are dorsally furnished, (Westwood.) When stationary on the surface of the water in still, hot weather, they are able, by a single stroke of their oar-like paddle-feet, (which are generally stretched out at full length,) to descend into the water out of sight; in the water their motions are quick, but on the land they are scarcely able to walk, and they fly well, their under wings being exceedingly delicate. Like the other water-bugs, they fly from pond to pond in the evening or at night. They are carnivorous, and it has been observed that insects attacked by them die very soon after being pierced with their beak; this is supposed to be in consequence of some poisonous liquid being injected into the wound. Indeed, their rostrum is capable of inflicting a severe puncture or wound in the hands of those who take hold of them without due care. In the Practical Entomologist, it is stated that the insect punctures the skin, causing "a sort of sting;" but Mr. Walsh believes there is no poison-bag attached to the instrument. We, ourselves, however, who have felt all the disagreeable

effects produced by their piercer, and also observed the almost instantaneous death of insects pierced by them, (as also mentioned by Amyot,) should think that a mere puncture could not produce the prolonged pain and subsequent inflammation we experienced; but that some liquid poisonous substance had been introduced into the wound.

Notonecta insulata, (Fig. 62,) a reddish-brown water-bug, is a very common insect in Maryland, and is found in pools and wet ditches. It feeds on aquatic larvæ and insects, and possibly may also injure very small fish.


Fig. 62.

Notonecta irrorata, (Fig. 63,) also of a brown color is said to be a very common form in Massachusetts.

According to Ballat, two Mexican species deposit their eggs on water-plants, where the Indians collect them and use them in the preparation of several articles of food. In the Popular Science Review (for 1875, January, p. 18,) it is said that "a no less curious article of food is the egg of an insect which inhabits the fresh waters of Mexico, and which is made into cakes under the name of *Haoutle*." This, however, most probably refers to the eggs of *Corixa femorata* or *C. mercenaria*, before mentioned, and not to a *Notonecta*, as the specimens presented by Mons. Guerin Meneville to the Department of Agriculture belonged undoubtedly to *Corixa*. However, as both *Corixa* and *Notonecta* have the same habits and inhabit the same ponds and lakes, some of the *Notonectades* may have been taken at the same time, and described as the insect producing the edible eggs.

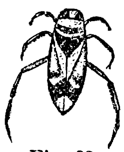


Fig. 63.

REMEDIES REPORTED TO BE SERVICEABLE IN DESTROYING INSECTS OF THE SUBORDER HETEROPTERA, OR PLANT-BUGS.

A patient study in the open field of the natural history, habits, instincts, and favorite food or haunts of the insects injurious to the crops is absolutely indispensable to the working naturalist who wishes to find out successful methods of destroying them, as it is only by knowing what substances are especially disagreeable to their taste or smell that we can drive them away, or by placing substances they are especially fond of in their haunts that we can allure them to destruction. A thorough knowledge of their habits and instincts will also teach us where to look for them, at what time, and on what plants. For example, although Paris green is eaten by the larvæ of the Colorado potato-beetle when sprinkled on the outside of the leaf of the potato, and proves certain death to millions of them, as the larvæ possess jaws and eat the whole substance of the leaf, poison and all; yet a plant-bug on the same leaf would probably escape without injury, as insects of the suborder *Heteroptera* do not eat any of the leaf itself, (not having jaws,) but merely pierce the outer cuticle in order to reach the parenchyma, or inner substance, to suck the sap, and most probably not a particle of the poison on the outside of the leaf would enter the piercer or sucker of the plant-bug. Again, the tobacco-fly, moth, or sphinx, by means of its very long, flexible trunk, or sucker, is enabled to reach the nectar at the bottom of the long tubular flowers of tobacco and Jamestown weed, (*Datura*,) which it sucks during the evening twilight. Advantage has been taken of this habit to drop poisoned sirup or honey into these flowers, which being imbibed by the sphinx causes its death

in a short time, without giving it a chance to deposit its eggs. Yet the same remedy in the same flowers would be of no use if applied to destroy moths of the cut-worms, (*Agrotis*, &c.,) as their trunks are much too short to reach the poisoned liquid at the bottom of the long blossom of the tobacco-plant.

It is also necessary for the naturalist to find out whether certain insects are beneficial to the farmer by killing other noxious insects or not, before wantonly taking their lives; as, although an insect may frequent a particular plant or tree, it is by no means certain that it feeds upon the plant, it frequently happening that the insect visits such plants merely for the sake of feeding upon other insects that are in the habit of injuring the plant itself, or are attracted by its flowers.

In the suborder *Heteroptera*, however, it is very difficult to distinguish friends from foes, or even to decide whether certain plant-bugs are more beneficial or injurious, as many of them at almost the same time are herbivorous and carnivorous, one minute sucking the sap of the plant itself, and the next minute draining the life juices of some insect which feeds upon and destroys the same plant. If poison be used to destroy insects of this suborder, it should be in a liquid state, like very thin sirup, so that the insect can take it into its stomach through the very narrow sucking-tube. A double net of cotton or gauze (as described in a former report) will be found exceedingly useful in capturing the agile *Capsidæ* and other small nimble plant-bugs. The net is brushed lightly against and under the plants until a sufficient number of the noxious insects have been collected in the second net or bag, which can be emptied out into boiling water, or its contents otherwise destroyed. For the cabbage-bug, (*Strachia histrionicha*,) the squash-bug, (*Anasa tristis*,) and insects of the same habits, the same remedies here mentioned will answer. Hand-picking early in the morning, and before they have thawed out into life and activity, is always a sure and good, but slow, method. The females and bunches of eggs should be sought for early in the season, before the young bugs hatch out and spread over neighboring plants; and it must be remembered that anything which contributes to bring the plants forward rapidly, and promotes the vigor and luxuriance of their foliage, renders them less liable to succumb to the attacks of insects. A weak solution of good guano, or water drained from a cow-yard, or mixed with well-rotted manure, applied to the roots, is very invigorating to young plants, and causes rapid and healthy growth; but care should be taken not to make the mixture too strong, else it would probably do more injury than good. When plant-bugs injure cabbage, squashes, &c., planted singly or in rows, it would be well to have the ground rough upon the hills or between the rows, and to lay loose shingles on it near the plants, under which the bugs will crawl at night, and where they may be found in the morning and killed. Small heaps of old trash, such as corn-stalks, weeds, &c., may be made here and there on the ground near the plants to be protected. These heaps should be examined frequently to see if the bugs have taken refuge under them, either from the heat of the summer's sun, or from the cold of winter, and if they have done so, in sufficient unmbers, when the brush is dry fire can easily be applied, and the trash and bugs destroyed together. The crushed stalks of sugar-cane and heaps of old refuse cotton-seeds have been used in this manner in Florida to destroy the red bug, or cotton-stainer, and found to be very useful, as these substances furnish the bugs, not only with shelter, but also with abundance of food. Large leaves of plants, cabbage, squash, &c., may be cut off the parent plants,

and placed on uneven ground. These withering leaves form excellent traps for several plant-bugs. The leaves, however, should be examined early in the morning, before the insects have been warmed by the heat of the sun, and escaped from their nocturnal shelter. Small wooden boxes covered with gauze are frequently used to protect very young plants from insects, until they have acquired size and strength to resist their attacks. An oblong four-cornered hole, about 12 (or more) inches in depth, and a little smaller than a pane of glass, (say 7 by 10 inches, or larger if required,) dug in the earth in a place where there is a sandy subsoil or good drainage, and then half filled up with good rich soil in which to plant a few seeds, and the hole then covered over with the glass, and loose earth heaped around the edges to exclude the air and insects, forms a very good miniature hotbed for cucumbers, squashes, melons, &c., as likewise for striking cuttings of roses, &c., if sand be employed instead of rich earth; and should the sun prove too powerful, a slight scattering of sand or loose soil over the glass will protect them. When the plants have grown some size, the glass can be removed, and the hole filled up to its former level. The glasses can afterward be gathered together and stored away in some outhouse in much less space and with less trouble than so many unwieldy wooden boxes. A mixture of one part of Peruvian guano with three parts of plaster or lime is said to be offensive to most insects. A strong decoction of quassia, or berries and leaves of the pride of China tree, might drive plant-bugs away from the plants. Paris green or hellebore sprinkled over the leaves, when moist with dew or rain, would doubtless destroy many larvæ of beetles and other insects having jaws, but probably would not have much effect on insects having suckers, as in the *Heteroptera*, or plant-bugs, although they might make them avoid the plants.

Sulphur, soot, wood-ashes, lime, and even dry road-dust, sprinkled over young plants, have, in some cases, proved beneficial in driving away insects; and paper, rags, or sawdust soaked in kerosene or carbolic acid and water are said to be so offensive to insects as to cause them to leave the plants. Soap-suds made from whale-oil, or cresylic soap, tobacco-water, &c., have also been highly recommended by some of our correspondents as being very disagreeable to the organs of smell, if not of taste, of many plant-bugs. As remedies for these insects, Dr. Harris recommends sprinkling with alkaline solutions, potash and water, decoctions of walnut-leaves, and perhaps a decoction of the leaves of the China-berry tree, might answer in the Southern States, as a correspondent in Georgia says that they have been used with very beneficial effect to drive away cut-worms. Most of the plant-bugs hibernate, or remain all winter, in a semi-torpid state, under bark of old trees, stones, moss, &c. It would therefore be advisable, at the approach of spring, to burn all old stumps and dead or decaying wood, weeds, &c., near the garden. Old stone fences, piles of loose stones, hedge-rows of weeds and briers, and dead trees are the places where many of our plant-bugs and other noxious insects spend the winter, and whence they issue forth in spring to deposit their eggs. Innumerable larvæ and pupæ of noxious insects are also found in the same places, waiting only for the warm weather to complete their changes. If these places are examined in midwinter, the entomological student can procure a very good collection of specimens for his cabinet, even when the ground is covered with ice and snow. Mr. Walsh, speaking of the *Capsus*, a small nimble plant-bug, very numerous and destructive to the foliage of plants, says, "If my own trees were attacked I should go to work early in the morning, while

they are dull and sluggish, shake them off the trees on a cloth, and crush them between the finger and thumb."

Turkeys, fowls, ducks, insectivorous birds, and some small animals are also useful agents by destroying multitudes of injurious insects. Even common mice have been known to dig up and eat the larvæ of the peach-tree borer in a grape-house, where the gardener had almost extirpated them as injuring the roots of his vines, whereas the animals had made the holes merely to search for animal food, and had not touched the roots at all.

Several of the remedies above mentioned under the cabbage-bug (*Strachia histrionicha*) are also recommended to be used for several other heteropterous insects having somewhat similar habits, such as the plant-bugs injuring squashes, &c., *Anasa tristis*, *Rhopalus lateralis*, *Nysius raphanus*, and many others. The chinch-bug, *Micropus* (*Rhyparochromus*) *leucopterus*, is exceedingly destructive in the grain-fields of the West, and many remedies have been recommended or suggested for their destruction, or to drive them away. Among the rest, lime is said to have been used with good effect when dusted over the plants when the insects first appear. Other farmers, however, assert that they have used lime, and have derived no benefit from it. Burning the ground before plowing, or after the infested crops have been removed, has also been recommended; and all the chaff and refuse remaining after winnowing grain ought likewise to be burned; and, as before mentioned, if small piles of refuse or trash be heaped up here and there in the fields, and after cold weather sets in, when these heaps are dry enough to burn, they are fired on a chilly morning, all the insects sheltering under them will be burned and destroyed; and chinch-bugs are very apt to take shelter under such heaps from the inclemency of the weather. From other farmers we have received reports as to the efficacy of gas-lime in driving the insects away from growing crops; but they say nothing about the benefit or injury the plants themselves receive from such an application.

In a former volume, Mr. Laughlin states that although he used lime with no effect whatever, yet the "application of salt to only one acre of wheat, in the proportion of one bushel to the acre, drove all the insects away and saved his crop on that single acre, while the rest of ten acres planted was destroyed by chinch-bugs." Salt, however, when applied too freely would be very apt to injure the plants themselves. Mr. Laughlin also states that he was satisfied that if he had sown $1\frac{3}{4}$ bushels of rock-salt (not more) to the acre, by the first of June, or 10 to 14 days sooner, he would have saved his whole crop, and at the same time he recommends a spoonful of salt to be put on each hill of maize. Some farmers at the West tried the experiment of sowing Hungarian grass with wheat and other grains, and state that their crops have been saved by the chinch-bugs preferring the tender grass, leaving the grain uninjured. Open ditches or trenches dug around the fields overrun with chinch-bugs have been highly recommended as preventing the migrations of these insects from them to other uninfested fields in the immediate vicinity. These trenches should be dug a foot or more in depth, having a sloping side toward the infested field and a perfectly perpendicular side toward the field intended to be protected, so that the insects could readily crawl into the trench from the field already injured, and, not being able to crawl up the perpendicular side toward the uninjured field, would fall back into the trench, and could be destroyed by lime or gathered up and burned, but should by no means be only half killed and buried, as they might revive and make their escape out of the earth. It would even be better if the protecting side of the trench should slope somewhat inward,

so as to make its upper edge project a few inches over the trench, and then it would be almost impossible for any of the wingless larvæ or pupæ to ascend and crawl into the neighboring fields. Fence boards set lengthwise, with the ends close together, or even a little overlapping each other, and the lower edge sunk a little in the earth, so that the chinchbugs could not creep through the crevices made by the joining of the boards, or underneath, the upper edge being kept moist with coal-tar, will also prevent the migration of chinch-bugs from field to field. They are unable to cross the tarred line, and fall to the ground inside the fence.

For bed-bugs, (*Acanthia lectularia*,) washing the bedsteads with boiling water mixed with salt or alum, corrosive sublimate and alcohol, lard and quicksilver, have been highly recommended, especially the corrosive sublimate; although, if the bedsteads are varnished, care should be taken not to use any substance that will take off or discolor the polished surface, as we have known varnished bedsteads almost totally disfigured by the incautious use of some of these mixtures. Persian insect-powder (only when perfectly fresh) blown into the crevices with bellows made for that purpose will stupefy and destroy many; but the great remedy is cleanliness, and a constant care and vigilance every few days to examine all the crevices and joints, to make sure that none of the pests are hidden away. As these insects deposit their eggs in cracks in the floor, or walls, under carpets, in old furniture, and in all secret or dark places they can find, it is necessary that the application of all the remedies used should be very thorough, and perfect cleanliness should be preserved by frequent scalding and whitewashing when practicable.

There are a few heteropterous insects that feed upon bed-bugs, mentioned under the head of *Acanthia lectularia* in the former part of this work; but they are not numerous enough to do much good, and, besides that, some of them frequently also attack mankind, and, from their size and strength, inflict much more severe wounds than the bed-bugs themselves. Many of the carnivorous *Heteroptera*, *Prionotus cristatus* and others, are able to inflict very severe wounds with their beaks or piercers, which they thrust into the flesh, at the same time ejecting a poisonous liquid into the wound. The pain from such stings, or punctures, may be very much alleviated by an application of liquid ammonia.

In conclusion, we would again urge farmers to clear up all weedy fence-corners, remove all old heaps of loose stones and rubbish, and to burn all trash, rotten stumps, and decaying wood, as such places serve only as a shelter to all noxious insects during the winter, and from which they issue forth in spring to scatter themselves over the whole farm, and lay the eggs of the millions of injurious insects which in summer and autumn destroy the hopes of the husbandman, and are most generally not observed until they have become too numerous to be destroyed without immense labor and toil.

TOWNEND GLOVER,
Entomologist.

HON. FREDK. WATTS,
Commissioner.

REPORT OF THE CHEMIST.

SIR: I have the honor herein to report the results of the work prosecuted in the division under my charge subsequent to the publication of my report for last year.

The work has been to a certain extent interfered with on account of the demands made upon our time by the enterprise of collecting material illustrating the utilization of agricultural and horticultural products for exhibition in the International Exhibition to be held in Philadelphia during the present year. This has involved a large amount of correspondence and personal attention, and the work in the laboratory has been correspondingly hindered.

According to the rule adopted and carried out in previous years, the investigations in the laboratory have been confined to matters involving a scientific principle not heretofore established, or to work having at once a scientific and practical value. In all cases in which applications for work have, on account of this rule, been rejected—that is, in which the matter presented has been one of mere curiosity, of personal speculation, or of limited practical value—we have endeavored to give such reply and such information as was warranted by the results of investigations of similar matters heretofore recorded, or by a general physical or qualitative examination of specimens presented. We have objected to the prosecution of any investigations similar to those already worked up in this Department the results of which have been embodied in our reports, excepting in cases in which it appeared necessary to confirm results previously obtained. In reply to questions involving principles similar to those already published, we have invariably referred our correspondents to the reports of the Department for previous years.

Following the rule thus enunciated, we have prosecuted investigations upon the following subjects:

1. The influence of caustic magnesia upon the vegetation of so-called lime soils.
2. The proximate composition of two varieties of sugar-corn.
3. The influence of arsenical compounds, when present in the soil, upon vegetation.
4. The influence of illuminating-gas upon the aërial portions of plants.
5. The percentage of morphine in a sample of opium produced in Tennessee.
6. The chemical composition of the mineral-matter of cranberries.
7. The composition of certain cave-deposits found in the Southern States.
8. The percentage of tannin contained in various tanning-materials.

I submit the results of the above-mentioned investigations, except 7 and 8, which are not yet complete.

I also submit copies of correspondence on the subject of the so-called poison-soils of Texas.

1. *The influence of caustic magnesia upon the vegetation of so-called lime soils.*

Mr. Abram McMurtrie, of Belvidere, Warren County, New Jersey, has for many years past made use of the dark, steel-gray limestone of that locality for agricultural purposes, and has repeatedly found that the lime produced from it seemed in nearly every case to have a rather injurious effect, but was wholly unable to account for it. When the lime was placed out in open fields to slake, the spots occupied by the heaps,

even when the lime was removed very carefully and no appreciable quantity was left behind, remained perfectly barren for two or three subsequent years. Very frequently, the crops to which the lime was applied showed indications of an injurious action in a very decided manner, and this influence always appeared more marked in wet than in dry seasons. In fact, a wet season sometimes determined a complete loss of the whole crop, especially when it happened to follow immediately upon the application. Believing that a change in the kind of lime employed would at least occasion no loss, Mr. McMurtrie was induced to try a lime produced from stone taken from a quarry three or four miles distant, and said to be particularly beneficial in its results. This limestone was of very light-gray color, somewhat resembling granite in appearance, and the lime produced from it, when thrown out in heaps to slake, though rather dark at first, upon slaking changed to a light buff color. Its effects seemed to be almost directly opposite to those of the lime previously employed; and the difference between the effects being so decidedly marked, it was considered of some importance to investigate the cause of this action by means of chemical analysis. Samples of the limestone were therefore obtained and analyzed, with the following results:

No. 1 is a sample of that producing the beneficial effects. It was obtained from a vein running across the farms of Messrs. George Radle and Philip Raub, near Oxford, and has the following composition:

Moisture	0.70
Carbonate of lime	92.61
Carbonate of magnesia	0.914
Oxide of iron and alumina	2.06
Silica	3.75
	100.034

No. 2 was obtained from the quarries of Mr. A. Depue Roseberry, near Belvidere, and has the following composition:

Moisture and organic matter	1.30
Silica	3.31
Peroxide of iron and alumina	2.12
Carbonate of lime	51.20
Carbonate of magnesia	42.10
Phosphoric acid	trace.
	100.03

No. 3 was taken from the quarries of Mr. E. J. Mackey, located very near the boundary of Belvidere. The analysis resulted as follows:

Moisture and organic matter	1.40
Silica	2.13
Peroxide of iron and alumina	0.82
Carbonate of lime	56.80
Carbonate of magnesia	38.31
Phosphoric acid	trace.
	99.46

A glance at these analyses is sufficient to show that the deleterious effects of the lime produced from the limestone from the quarries represented by Nos. 2 and 3 are due to the high percentage of magnesia they contain, and that the beneficial effects of the other lime is due to the absence of this constituent.

Many agricultural chemists acknowledged as authorities fail, in their writings upon the subject of mineral fertilizers, to note the fact of the injurious action of caustic magnesia upon vegetation, and in fact the only writer who seems to have recognized it is Sir Humphrey Davy,* who re-

* Elements of Agricultural Chemistry, London, 1814.

ports experiments upon this subject made by himself, and others made previously by Mr. Tennant. He explains the injurious effects upon the theory, since confirmed by experiment, that caustic magnesia in presence of caustic lime absorbs carbonic acid very slowly, and that on this account remaining a long time in the soil in the caustic state it exerts the deleterious influence noticed in the limes mentioned above. The limes in question were applied to rather light sandy or gravelly soil; but according to Davy, the same lime might be applied to heavy soils, containing considerable quantity of organic matter, with decidedly good results, and that upon light soils, where pure lime is not obtainable, the magnesian limestone should be applied in small quantities. The caustic action of the magnesia may in such cases be very materially ameliorated by a tolerably heavy application of stable-manure. In the locality in New Jersey referred to, however, we would advise those farmers who have suffered the inconveniences and losses resulting from the use of magnesian limestones to employ the other, even though they may be subjected to greater expense in the matter of transportation.

It has been suggested that the magnesia combining with water and silica forms a hydraulic cement in the soil, and that the injurious effects are due to such a combination.

This cannot, however, be considered a correct theory, since these magnesian limestones have been used upon clay soils and their application to such soils has no deleterious effects. It would seem that the magnesia reacting upon the silicate of alumina forms a double silicate of alumina and magnesia, thus neutralizing its causticity, and that the injury consequent upon the application of magnesia lime to sandy or gravelly soils is to a large extent due to a deficiency of clay.

2. *On the proximate composition of two varieties of sugar-corn.*

The difficulties accompanying the prosecution of proximate organic analysis of sugar-corn may have been considered sufficent cause for our failure to find upon record any reliable statement concerning its composition; but it appears to be a fact that chemists have thus far either avoided it or have failed to come in contact with it. When called upon a short time ago by Mr. T. Worthington, of Morrow, Warren County, Ohio, tor information concerning its composition and comparative value as a material for the manufacture of alcoholic liquors, we found it necessary to resort to analysis to determine the facts desired.

The method employed in our analyses was essentially the same as that made use of in previous analyses of corn as published in the Annual Report of this Department for 1873; the only difference being a slight modification in the separation and estimation of gum and dextrine. Methylic alcohol dissolves dextrine without attacking gum, and we therefore employed it in their separation.

For comparison, we have also made an analysis of a sample taken from a lot of corn held by this Department for distribution. There seems to be considerable difference in the composition of these two samples; but this may naturally be expected, on account of the different qualities ascribed to the several varieties of this kind of corn. The sweet taste is evidently due to the high percentage of dextrine it contains, and we should expect to find greater variation in the amount of this constituent than in that of the others, since it is so well known that some varieties of sugar-corn are much sweeter than others. However, further analyses will be necessary to determine how far this variation extends. The analyses resulted as follows:

No. 1 is a sample from Ohio.

	Air-dried.	Calculated for dry substance.
Moisture	10.00	....
Oil	6.00	6.67
Gum	7.25	8.06
Dextrin	5.20	5.77
Zein	5.95	6.61
Sugar	1.60	1.77
Starch	50.56	56.17
Albuminoids	7.75	8.61
Cellulose	4.24	4.72
Ash	1.45	1.62
	100.00	100.00

No. 2 is a sample obtained in the Department:

	Air-dried.	Calculated for dry substance.
Moisture	6.40	....
Oil	7.30	7.79
Gum	6.15	6.58
Dextrin	5.15	5.50
Zein	5.25	5.61
Sugar	1.65	1.76
Starch	49.85	53.27
Albuminoids	10.45	11.16
Cellulose	6.33	6.76
Ash	1.47	1.57
	100.00	100.00

With regard to its value for the manufacture of alcoholic liquors as compared with common field corn, little can be said in its favor. For comparison in this particular, I quote analyses published in a previous report. In this case, the results are calculated for dry substance:

	No. 1.	No. 2.
Oil	5.67	6.10
Sugar	1.21	2.66
Gum and dextrin	1.35	1.06
Zein	2.17	1.58
Starch	77.54	76.50
Albuminoids	8.71	9.09
Cellulose	1.89	1.66
Ash	1.46	1.35
	100.00	100.00

No. 1 represents the composition of a yellow corn grown in Pennsylvania, and No. 2 that of a white corn from Maryland.

These tables of analyses show that the sugar-corn cannot be recommended for the purposes suggested, since its contents of starch, gum, and dextrine amount to only 61 and 63 per cent., while those of the field corn reach about 72 per cent. With this fact, and its incapability of producing as large a crop as the field corn, against it, it is doubtful whether sugar-corn will ever have any application other than that which it at present has, viz, for food in the green state.

3. *The influence of arsenical compounds, when present in the soi vegetation.*

In a previous report,* I took occasion to publish the results o preliminary experiments, made principally to determine whether a when applied to plants in the form of Paris-green for the destruc the Colorado potato-beetle, could, when transmitted to the soil,

* Report of the Commissioner of Agriculture for 1874.

PLATE X

EFFECT OF PARIS GREEN UPON GROWING PLANTS.

sorbed and assimilated during growth, and at the same time I gave the results of experiments of others in the same direction. My own experiments having been of a somewhat unsatisfactory character, and those of others having furnished such extremely discordant results, I finally determined to follow out the investigation about to be described to endeavor to settle this question, together with others which subsequently arose. These subsequent questions were suggested by the fears entertained by some of our correspondents that, when Paris-green was applied to crops year after year, sufficient quantity might accumulate in the soil to poison it sufficiently to destroy its fertility and render it incapable of producing vegetation.

My investigation was therefore made to determine—

1st. If applied to the soil, can arsenic or arsenious acid be absorbed and assimilated in the economy of plant-growth?

2d. If absorbed and assimilated, can it be taken up in sufficient quantity to become prejudicial or injurious to the health of consumers?

3d. If not taken up by the plant during growth, does it by its presence in the soil exert a poisonous influence upon the plant itself?

4th. If it exerts a poisonous influence upon the plant, to what extent may it exist in the soil before it becomes injurious?

The experiments were conducted as follows:

Fifteen common flower-pots, of as nearly uniform size as possible, were selected, and each one filled with a measured quantity of good garden-soil. With the soil of each pot were then thoroughly intermixed quantities of Paris-green, ranging from 100 milligrams to 1 gram. Thus one pot contained 100 milligrams; that next to it contained 200 milligrams; the next 300; and this quantity was increased until it finally reached 1 gram. In the other pots, the increase was made more rapid, and the other pots contained 2, 3, 4, and 5 grams respectively. After the soil had thus been carefully prepared, a given number of pease, all of which were carefully selected, so as to secure as nearly as possible those of the same size and appearance, were planted in each pot. This experiment proved unsatisfactory, from the fact that on one night that portion of the greenhouse in which the pots had been placed became too cold, and a large number of the seeds failed to germinate on this account. I therefore considered it of some importance to duplicate the experiments, and, without disturbing these further than to remove them to a warmer portion of the greenhouse, prepared in a similar manner, and with the same care, another series of pots. At this time, the question also arose, What would be the effect of arsenic in combination, as arsenite of potassa and arseniate of potassa? For the purpose of determining this, I prepared two other series of pots in the same manner as before, and placed them alongside the former. With these experiments, my results were extremely satisfactory; and when those plants which had grown well had reached the period of bloom, the three series of pots finally prepared were each placed by themselves in a convenient position and photographed, and from the photographs thus obtained the accompanying illustrations were made. In these experiments, for the sake of comparison, one pot of soil was prepared without addition of any poisonous compound. Now, it is quite evident from these plates that the arsenical compounds in the soil did produce an injurious effect, and in some instances, in fact in the majority of them, it was decidedly marked. In case of the Paris green, as shown on Plate 10, it is not noticed until the quantity present in the soil reaches 500 milligrams, and that in the other pots the size of the plants decreases regularly as the quantity of arsenical compound

present increases. The numbers on the pots in the different plates represent the quantities present in grams and tenths of grams.

In case of the arsenite of potassa, (Plate 11,) the effect seems to be more immediate. This may be due either to the greater solubility of the compound or to a possibly larger quantity of arsenious acid. The potash compound seemed nearly pure, being crystallized, and the purity of the copper compound was not estimated. Yet in this case the effect does not seem decidedly marked until the quantity present reached 300 milligrams.

To the influence of arseniate of potassa the plants seemed to be more sensitive still; for those in the pot containing but 100 milligrams seem to be affected. Yet even when 200 milligrams are present, the plants seem to thrive tolerably well.

What, then, are the quantities of these compounds which may be applied to the soil for the various purposes in practical agriculture before effecting any injurious results? The amount of soil in each of the pots employed in these experiments was 91.5 cubic inches. In case of the Paris-green, the limit is 500 milligrams for this quantity of soil, which is equivalent to 145.6 grams per cubic foot, or 906.4 pounds per acre, calculating for a depth of one foot. The limit for arsenite of potassa, being 300 milligrams per 91.5 cubic inches, is about 540 pounds per acre. Though the plants seem to be affected by even a small quantity of arseniate of potash in the soil, I am nevertheless inclined to the opinion that this compound may be applied at the rate of 150 pounds per acre without any great injury to the crop. For practical purposes, however, it is never necessary to apply in any case so large an amount.

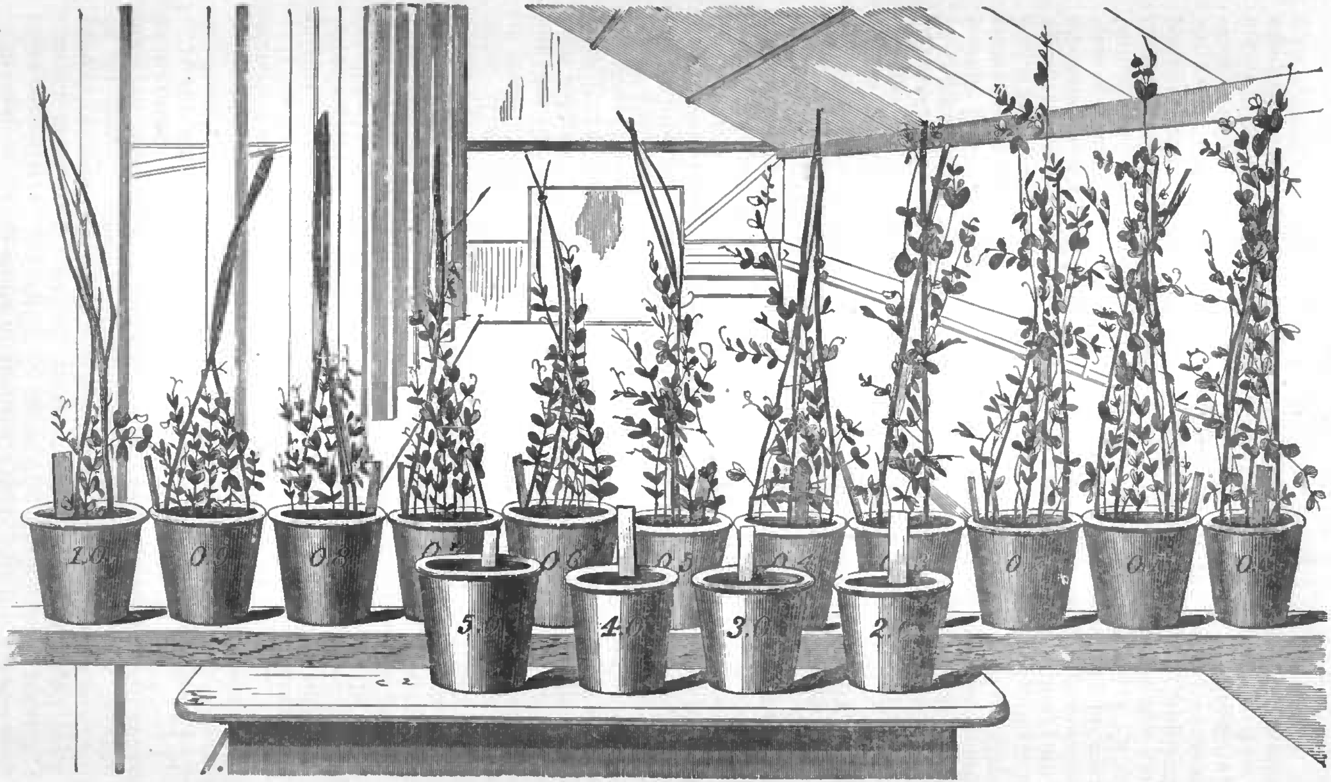
These results are confirmed by the water-culture experiments of Professor Freytag* in his investigations upon the influence of the sulphurous and metallic fumes of the Freiberg Metallurgical Works upon the vegetation of the surrounding fields. He found that plants were killed when placed in solutions containing $\frac{1}{80}$ per cent. arsenious acid, $\frac{1}{50}$ per cent. sulphate of zinc, $\frac{1}{40}$ per cent. sulphate of copper, $\frac{1}{25}$ per cent. sulphate of cobalt, $\frac{1}{15}$ per cent. sulphate of nickel, and $\frac{1}{5}$ per cent. sulphate of iron.

Mons. E. Heckel† states that 25 milligrams of arsenious acid, or the soluble arseniates in 90 grams of water, prevents germination and destroys the embryos of seeds.

I cannot, however, agree with Professor Freytag in the statement that the arsenious acid and the oxides of zinc and lead cannot be injurious to vegetation on account of their property of forming insoluble compounds in the soil, since in some of my preliminary experiments presence of such insoluble compounds as the arseniates of barium, strontium, and magnesium was sufficient to prevent germination. Again, in reports upon the composition of certain mineral-waters of Germany, we notice statements of the presence of such insoluble compounds as arsenite of iron in solution. These facts argue against the possibility of accumulation of sufficient arsenic in the soil by regular applications of Paris-green in the quantities recommended for the destruction of the Colorado potato-beetle. When rotation of crops is observed, and application of the poison cannot therefore take place upon the same plot more than once in three or four years, it is probable that each application, being acted upon by the natural solvents in the soil, will be removed by drainage before another is made. And yet, even when annual applications

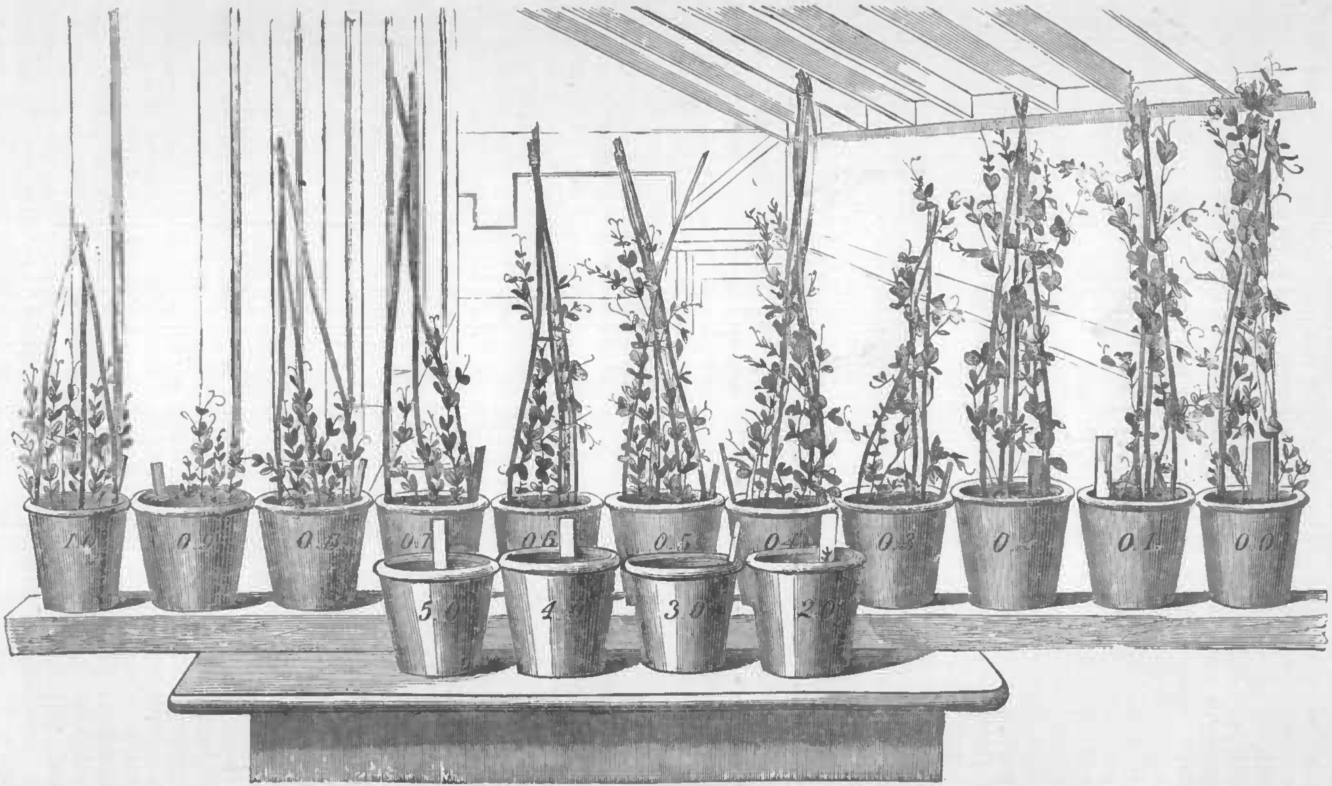
*Jahrbuch für Berg- und Hüttenwesen, 1873.
†Comptes rendus, t. lxxx, 1172.

PLATE XI.



Effect of Arsenite of Potassa upon Growing Plants.

PLATE XII.



EFFECT OF ARSENIATE OF POTASSA UPON GROWING PLANTS.

are made, so much time must elapse before the limit could be attained that no injury need be feared from this cause.

Now, can arsenic be absorbed and assimilated by the plant in the economy of growth? My investigations give a negative reply. All of the plants grown, from the largest to the smallest, were examined by careful application of Marsh's test; yet I failed in any case to detect the presence of arsenic.

Before making the test, the organic matter of the plant was destroyed by boiling it in hydrochloric acid with addition of potassic chlorate, and the solution filtered.

I also carefully examined potatoes which had been subjected to applications of Paris-green, and which were furnished by Mr. George W. Campbell, Delaware, Ohio, Mr. D. C. Richmond, Sandusky, Ohio, and Mr. J. S. Nixon, of Chambersburgh, Pa., and failed in any case to detect the presence of arsenic.

With these facts before us, and without considering what might be the result of a series of experiments continued through a number of years, we must conclude that plants have not the power to absorb and assimilate from the soil compounds of arsenic, and that though arsenical compounds exert an injurious influence upon vegetation, yet this is without effect until the quantity present reaches: for Paris-green, about 900 pounds per acre; for arsenite of potassa, about 400 pounds per acre; for arseniate of potassa, about 150 pounds per acre.

4. *The influence of illuminating-gas upon the aërial portions of plants.*

The subject of the influence of illuminating-gas upon vegetation has, until within the past year or two, been almost wholly neglected. In 1873, some observations made in Berlin (Ding. Polyt. Jour., ccvi, 345) determined the fact that gas escaping from the pipes exerted an injurious influence upon the surrounding vegetation, with the roots of which it came in contact, and careful experiment showed that this effect could be observed when so small a quantity as 25 cubic feet per diem was distributed through 144 square feet of soil to a depth of four feet. In fact, the plants whose roots permeated this quantity of soil, 576 cubic feet, were by such treatment killed in a short time, and it appeared that less time was required to produce this effect when the surface of the ground was closed and more compact. During the same year, J. Boehm (Chem. Centr., 1873, 755) made some experiments by passing coal-gas through the soil of pots containing varieties of fuchsia and salvia, and of the ten plants experimented upon seven died in four months. Further experiments convinced him of the fact that the plants were killed, not by the direct action of the gas upon the roots, but by poisoning the soil. It seems, therefore, pretty well established that when coal-gas permeates through the soil it has an injurious action upon the vegetation with which it may come in contact. My attention has, however, been attracted to a somewhat different action of the gas, which seems equally as destructive as that just described. Boehm found, in the course of his investigation, when cuttings of willow were placed in bottles containing a small quantity of water, and otherwise filled with illuminating-gas, as the buds developed and the leaves began to appear the latter rapidly withered and died before reaching complete development. Now, this is the direction taken in my investigation. In Boehm's paper, he does not state the percentage of gas in the atmosphere necessary to produce the effect described, and my object was therefore, if possible, to estimate the approximate quantity of gas required to bring about such results. The question arose out of a dispute

concerning the destruction of an extensive stock of camellias in Philadelphia, in which it was alleged that the loss was due to the escape of gas from the street-mains. It was shown that the main was broken; that during the winter, the ground being frozen, there was no means of escape of the gas other than to work its way through the subsoil, and into the atmosphere through the ground of the interior of the greenhouse. The distance between the main and the greenhouse is not stated, but it appears that trees growing between the former and the latter were completely killed. It was to determine whether the result in dispute could be effected by the action of the gas. The plants were growing in pots placed upon stands, and it was therefore impossible that they should be injured through the medium of their roots. It was then to determine what might be the influence of the gas in question upon the aërial portions of plants that the investigation about to be described was instituted. In order to secure such conditions that the plants might be confined in an atmosphere containing a given quantity of gas, and yet be provided with the requisite degree of light, heat, and moisture, the plants were placed in closed boxes, provided with glass sides, the joints of which were cemented with white lead. When all was secured, a tube of glass was introduced through the side of the box and connected with the stop-cock of a gasometer. The stop-cock of the gasometer was then opened, and the gas allowed to flow into the box, until the entire contents of the former were transferred to the latter. The whole was then allowed to stand until the following day, when the gasometer was again filled with gas taken from the pipes supplying the laboratory, and one-half the contents transferred to the box. On the next day, press of other duties called my attention away from this work entirely, and the box therefore received no gas. On the fourth day, however, one-half the contents of the gasometer were introduced, and another day allowed to intervene before another application. Gas was then introduced into the box on four occasions, so that the amounts transferred, allowing 10 gallons for the capacity of the gasometer, were: February 24th, about 10 gallons; 25th, about 5 gallons; 27th, about 5 gallons; March 1, about 5 gallons. During this time, an occasional leaf, as well as one of the buds, fell from the plant, and on March 2, on opening the box to apply water to the plant, a slight jar caused a number of the leaves to fall. The plant was then carefully removed from the box, when a sharp shock caused nearly all the leaves to fall. The leaves which had fallen were then gathered about the base of the plant, the whole placed in a convenient position, and, together with the other plant, which had been submitted to the same conditions excepting the treatment with gas, and which remained perfectly sound and healthy, was photographed. From the photograph thus obtained, the accompanying illustration was made. Now, what was the relative amount employed? The dimensions of the box were: horizontal cross-section, two feet square; height, four feet. Calculating from the data at hand, we find that the amount first introduced was equivalent to about 7.7 per cent. of the entire volume of the box, and that the quantity subsequently introduced, being one-half this amount, was but 3.35 per cent. Without making any allowances for escape of the gas by diffusion, which probably took place, reasoning from the fact that when the box was opened no odor of gas was perceptible within the box, we find that after the first day the amount of gas did not exceed 4 per cent. of the volume of the box. It is, however, probable that the average quantity was much less than 3 per cent., and I am inclined to the opinion that if camellias or other plants be confined in an atmosphere containing continually 1 to 2 per cent. of illuminating-gas, they must suffer, and ultimately be killed.

PLATE XIII

Effect of Illuminating-gas upon Growing Plants.

5. *The percentage of morphine in a sample of opium produced in Tennessee.*

The cultivation of poppy in this country for the production of opium does not seem to have received the attention it deserves. The efforts of this Department to arouse an interest in this particular by distribution of seeds of the best varieties to its more progressive correspondents, have, however, been occasionally rewarded with reports of experiments of an encouraging character, and we take pleasure in publishing the following notes of an experiment, furnished by Mr. Charles Patton, Germantown, Tenn.:

I take great pleasure in reporting the result of my experiment in making opium from the seeds of white poppy received early this spring from the Agricultural Department; and, to substantiate in part my report, I have forwarded to the Department, by mail, a package containing the principal part of the opium produced, which you will please dispose of as suits your pleasure.

Having no other guide upon the subject than the communication in the Agricultural Report for 1870, one-tenth of an acre was measured off to receive the seeds. The plot had been cropped with turnips the previous fall, manured with sheep-droppings. On the 15th of April, the ground was plowed, harrowed, and dragged very fine, and the seed drilled in rows 18 inches apart. May 3, the hand-cultivator was run between the rows, and the plants thinned to a stand, 6 to 9 inches between plants. The cultivator was run once more on the 24th of May, and this was all the cultivation required. On the 15th of June, the plants commenced blooming, and two days thereafter the first opium was gathered. The implement used for scarifying was the blade of my penknife. One or two horizontal incisions around the capsule were in most cases sufficient to extract the opium. I find a greater loss of juice by the up and down incision than from the horizontal. An instrument making two or three cuts horizontally at one operation would prevent all loss, as each would be able to sustain the weight of the liquid until hardened by exposure. By the present mode of extracting, I think not less than 10 to 12 per cent. of the opium is lost. The plants ceased blooming about the first of July, and on the 4th the crop was finished, making eighty-one days from the time of planting.

The sample sent by Mr. Patton was reserved for exhibition and analysis. It was of fine homogeneous texture when dry, of dark-brown color, and was perfectly free from seeds, stems, or other extraneous matters, and weighed nearly five ounces.

The portion of the sample taken for analysis was found to contain:

	Per cent.
Moisture	15.24
Morphine	7.10

Comparing this result with those obtained from analyses of other varieties of American opium, or even of foreign products, proves it to be of fair quality, and from its appearance it is better than the average opium found in the markets.

It is about equal to good Egyptian and East Indian products.*

6. *The composition of the mineral matter of cranberries.*

The following are the results of an analysis of the ash of a sample of dark-red cranberries from New Jersey:

Moisture	86.50
Organic matter	13.25
Inorganic matter	0.25
	100.00

The inorganic matter contains:

Insoluble silica	0.874
Soluble silica	2.563
Lime	2.710
Magnesia	trace.
Peroxide of iron	1.253

*Compare Report of this Department for 1873, p. 174.

Phosphoric acid	19.309
Sulphuric acid	5.870
Chlorine	1.260
Potassa	56.683
Soda	9.338
	99.860

Correspondence relating to poison soils of Texas.—During the summer of 1872, the Department had occasion to investigate the cause of a property peculiar to certain soils of Texas and some of the neighboring States, and, from chemical analysis of a sample sent us, concluded it was due to a deficiency in underdrainage, a conclusion since supported by a letter from Mr. A. J. Graves, of that State.

Our attention was again called to this matter by Mr. R. Q. Mills, who communicated a letter from Mr. W. T. M. Dickson, of which the following is an extract:

About two years ago last month I forwarded to the Department of Agriculture, under instructions from the Commissioner of Agriculture, four packages of black soil, carefully labeled, wrapped, and mailed, for analysis. The object of the analysis, as explained in the accompanying letter, was to ascertain the cause and remedy of that peculiar property in our soils which is fatal to cotton and most garden-vegetables, to *bois-d'arc* and all our cultivated trees except the peach and most of the native trees. The cereals, however, wheat, corn, oats, barley, rye, &c., appear to be injured, but not destroyed by it.

In the following extract from a communication addressed to Mr. Mills by the Commissioner, it will be seen that these conditions are precisely similar to those described in the report referred to:

The difficulty existing in the soils of Texas, referred to by your correspondent, was fully discussed in the Annual Report of this Department for 1872, and the deductions there made have been fully corroborated by Mr. A. G. Graves, jr., of McKinney, Collins County, Texas. The position taken in the article in question, without personal examination of the locality, was, that the difficulty was due to a deficiency in underdrainage; that the water of the subsoil was held in place, thus precluding the admission of oxygen to the soil, and preventing the decomposition of the organic matter, holding the mineral elements of plant-food in insoluble combinations, not capable of being absorbed and assimilated by the plants in growth. This will explain why cereals and other plants supplied with superficial roots are uninjured; they being able to derive their nourishment from the surface-soil. But after plants having long tap-roots have reached that stage of development in which their roots penetrate the subsoil where this unfavorable condition exists, the subsoil, saturated to its fullest extent with stagnant water, is unable to give up the nutriment it contains, an unhealthy condition for the plants exists, and they naturally die from starvation and bad treatment.

Mr. Graves found, in preparing to set a fence through a piece of ground, where, from the cause in question, a hedge of osage-orange, or *bois-d'arc*, had become diseased and had died, that when holes were made to enter the subsoil of that portion where the destruction had been greatest and most marked, water rose in them, filling them to the same level. The description of his experience as detailed in his letter is as follows:

"I had occasion to run a line of fence across one of these spots where an osage-orange hedge had died out, a distance of about 50 yards. In boring post-holes for fence to close this gap, it was necessary to bore one at each end, just outside of the spot. The grade of the land was an inclination of about one foot in thirty. It being rather wet, water rose in the holes very quickly along through the spot, decreasing in depth somewhat near the ends, while in the holes just outside the spot it scarcely ran in at all."

This proves that where such a condition exists, the line of division between the surface-soil and subsoil is undulating, and the subsoil being of close texture, and impenetrable to water, underground ponds, if the term be allowable, are formed. When the roots of plants reach the level of the water and pass beneath it, destruction takes place.

Application of lime, as recommended in the article referred to, will doubtless have a good effect as a remedy for this difficulty, but the best way of removing it effectually will probably be found in underdrainage. From information we have received, this may be somewhat difficult in some localities, and may, in some cases, be impracticable. It has been suggested that, since below this hard stratum of subsoil may be found a stratum of loose sand or gravel, it will be possible to remove the water from these spots by piercing holes through the hard subsoil to the loose stratum below, and making such openings about the center of each spot. Whether this will be practicable, can

be determined only by experiment. It will, however, be worth a trial. Should your correspondent undertake such experiment, it would afford us great pleasure to be advised of the result. If successful, it will be of great value to all planters in the vicinity of the mouth of the Mississippi.

Our failure to examine the samples of soils when received was due to the fact that they were unaccompanied with a letter of instructions with regard to the locality from which they were taken, and the existing conditions. This is always indispensable in such investigations.

Other investigations are in progress, but the results are incomplete, and must consequently be reserved for a future report.

Very respectfully,

WM. McMURTRIE,
Chemist.

Hon. FREDK. WATTS,
Commissioner.

FOREST-TREES OF THE UNITED STATES.

CENTENNIAL COLLECTION.

SIR: The following list is a catalogue of the native and naturalized forest-trees of the United States which attain a height of 16 feet and upward. Descriptive notes of many species are appended.

By an act of the last Congress an appropriation was made to enable the different Departments of the Government to participate in the Centennial Exposition of 1876. In pursuance of this object, the Botanist of the Department of Agriculture undertook to make a collection to represent the trees of the United States. The aim was to represent every important tree by botanical specimens of the leaves, flowers, and fruit, and also by sections of the trunk, showing the appearance of the bark and of the wood; thus giving the completest possible view of every species. The great extent of our country and the immense variety of our arborescent vegetation made this of necessity a great undertaking. Well knowing that the chief value of such a collection would depend upon its scientific accuracy, arrangements were made to engage competent persons in the different fields of labor. In some portions of the country, local botanists were employed to collect the trees of their particular districts. But for the larger portion of the country it was necessary to employ traveling-agents, whose duty it was to explore a designated section, ascertain the localities of the trees desired, collect the proper botanical specimens at the right season, and, having carefully noted the localities, to return at the end of the growing period and obtain sections of the trees.

As collector for the Southern States, Mr. A. H. Curtiss, of Liberty, Va., a well-known botanist, was engaged.

A large number of the trees of the Middle States were obtained in the vicinity of Washington. Of these, thirty species were procured from a part of the General Washington estate at Mount Vernon, now owned by Dr. E. P. Howland.

The trees peculiar to the New England States were procured by Mr. C. G. Pringle, of Charlotte, Vt.

As collector for the Western States, Mr. John Wolf, of Canton, Ill., was employed. In making the collection in Colorado, he was assisted by Mr. C. W. Derry, of Granite, Lake County, Colorado.

The semi-tropical trees of Southern Florida were obtained by Dr. A.

W. Chapman, of Apalachicola, during a two months' cruise by schooner on the west coast, among the various keys and inlets, and far into the interior by the Caloosahatchee River. Dr. Chapman is an old resident of Florida, author of the "Flora of the Southern States," and better acquainted with the vegetation of that region than any other person.

A portion of the trees of Texas were obtained by Dr. S. B. Buckley, of Austin, whose labors in developing the botany of that section are well known; and a portion were collected by Dr. F. G. Lindheimer, a veteran botanist, whose collections of Texas plants, made many years ago, enrich the principal herbaria of the country.

In Utah, Mr. L. F. Ward, botanist of the survey of the Colorado River by Messrs. Powell and Thompson, made the collection of the trees of that region.

The trees of the high sierras of California and Nevada were procured by Mr. J. G. Lemmon, of Sierra County, California. The magnificent conifers of that region are represented by large wedge-shaped sections of trees from 4 to 7 feet in diameter, the preparation of which cost a great amount of toil and expense. The immense trees had to be felled, and the desired sections removed by sawing and splitting with wedges until the portions were reduced to proper size.

The trees of the Pacific slope in California were collected by Mr. G. R. Vasey, with valuable aid and assistance from Dr. A. Kellogg, of San Francisco, Dr. J. G. Cooper, and others.

Dr. Edward Palmer made the collection for the southern portion of California, Arizona, and Southern Utah.

Mr. A. J. Dufur, Centennial Commissioner for Oregon, collected the peculiar trees of that State.

After the woods were received at Washington, they were taken to a mill and reduced to the uniform length of two feet; then each section was divided by sawing longitudinally into two pieces, which were planed on the sawed surface, one arranged to show the outer or bark surface and the other to show the grain of the wood, its color, density, &c.

The corresponding botanical specimens for each species are displayed in frames arranged in the immediate vicinity of the trees to which they belong. By this means, an intelligent view of the appearance and properties of every species of the trees of the countrymay be obtained.

Great difficulty was experienced in deciding upon the limitations of height and size which should characterize a tree. It is well known that certain plants which are only shrubs in some places become large trees in other places; sometimes the difference depending on climate and sometimes on other circumstances. Thus, *Magnolia glauca*, or White Bay, grows and matures its flowers and fruit in some portions of Massachusetts, where it attains only the size of a large shrub. It, however, steadily increases in size in situations farther south, until in Georgia and Florida it attains the size of a large tree. In some places, the same plant appears as a shrub or a tree, under different circumstances, in closely contiguous localities. Dr. Chapman, who made the collection of the trees of South Florida, says: "I was much disappointed in the size of most of the forest growth in that region. A peculiarity of these tropical trees is, that for miles they occur to you as mere shrubs, when at some other locality you find them lofty trees." As a general rule, I have not admitted into the collection any tree which does not, under favorable circumstances, attain a height of 20 feet and a diameter of 4 inches. Yet, in a few cases, in order the more fully to illustrate a family, a tree has been admitted which would fall below that standard. The

accompanying catalogue enumerates about 400 species, the greater portion of which are represented by specimens in the collection.

Some portions of the country have been so incompletely explored that our knowledge of their vegetation is imperfect; yet it is probable that this catalogue presents, with great accuracy, our present knowledge of the trees of the United States. In two or three instances only, foreign species have been admitted, because of their extensive naturalization in some sections.

The two largest genera of trees are the oaks and the pines, of which we have about 30 species of each. Of coniferous trees, including the Pines, Firs, Cedars, Larches, Cypress, Sequoias, &c., we have about 60 species. The Rose family, including the Plums, Cherries, Thorns, &c., is represented by over 30 species. Of the order *Leguminosæ*, or trees of the pod-bearing family, we have over 20, embracing the Locusts, Acacias, Redbuds, Mesquits, &c. Of ericaceous trees we have 8 species, including the Californian Manzanita and Madrone trees, the Sorrel tree of the Southern States, and others. Of Maples we have 8; of Magnolias, 7; of Ash, 11; of Elms, 6; of Walnuts and Hickorys, 13; of Poplars, 8; and of Birch, 6 species.

The usual difficulty has been encountered of deciding as to the standing of certain forms which some botanists regard as species and others as only varieties. In most well-marked cases, these are entered in the catalogue under distinct numbers, either as species or as varieties, as the evidences in the case seemed most convincing.

The range, or botanical region, of each species is indicated in a general manner, thus: Those trees which occur more or less extensively over the whole or the larger portion of the country east of the base of the Rocky Mountains or east of the Mississippi River are marked Eastern United States. This region is subdivided, by a line running eastward from the mouth of the Ohio River to the Atlantic, into two portions, one of which is called Northeastern United States, and the other Southeastern United States. Other localities are indicated as Southern States, New England States, Western States, Alleghany Mountains, &c. The western portion of the United States and Territories is marked in detached regions, as follows: Rocky Mountains of Colorado, or Rocky Mountains of Colorado and Utah; Sierra Nevada Mountains of California, Oregon, and Washington Territory; California; Southern California; Arizona. The portion of the country adjoining the Mexican border is indicated by the locality Western Texas and westward.

Certain portions of our country have not yet been sufficiently explored to determine accurately all the species of trees thereto belonging. This is the case with respect to the southern portion of Florida. Some species which at one time were thought to be indigenous in that region have not been confirmed by any late investigations, and will probably have to be erased from our list. The same difficulty occurs with respect to some of the trees of the Rocky Mountains and the western coast, particularly the Conifers and the Willows.

In the short time allotted to making this collection, it has not been possible to obtain wood specimens of *every* species given in the catalogue. The number wanting, however, is but a small percentage of the whole.

Among the good results growing out of this work, we may mention, first, that much information has been gained respecting species hitherto imperfectly known; and, secondly, that four or five new species, or species before unknown to our flora, have been obtained. These are mainly in South Florida, and include two exogens, viz, an Anona or Custard

Apple, and a Chrysophyllum or Star Apple; and one endogen, a Palm of the genus *Thrinax.*

I wish to record my sincere thanks to the Hon. F. Watts, Commissioner, and to Mr. William Saunders, Centennial Agent of the Department, for all possible assistance rendered in the prosecution of the work.

Respectfully,

GEO. VASEY,
Botanist.

Hon. FRED. WATTS,
Commissioner

MAGNOLIACEÆ.

No. 1. *Magnolia grandiflora*, L.—Evergreen Magnolia.—Southern States. A large and beautiful tree, with thick glossy evergreen leaves, and large white flowers, which are exceedingly fragrant.

No. 2. *Magnolia glauca*, L.—Sweet Bay; White Bay.—Massachusetts southward. Northward, this is only a small tree or shrub; but in the South it attains a large size, and the leaves become evergreen.

No. 3. *Magnolia Umbrella*, Lam.—Umbrella Tree.—Southern States; Alleghany Mountains.

No. 4. *Magnolia acuminata*, L.—Cucumber Tree.—New York; South and West. This species has a greater range to the northward, where it sometimes attains a large size.

No. 5. *Magnolia cordata*, Michx.—Yellow Cucumber Tree.—Southern States.

No. 6. *Magnolia Fraseri*, Walt.—Long-leaved Cucumber Tree.—Southern States.

No. 7. *Magnolia macrophylla*, Michx.—Large-leaved Umbrella Tree.—Southern States.

No. 8. *Liriodendron tulipifera*, L.—Tulip Tree; Yellow Poplar.—Eastern United States. One of the largest and most beautiful of North American trees. In the Western States, it attains an immense size. It is found principally in the rich bottom-lands of the large rivers, where its wood is extensively employed for building purposes and for the manufacture of furniture. As an ornamental tree, it is hardly surpassed by any other; its form being regular, its foliage peculiar and pleasing, and its abundant flowers, though not highly colored, are yet very beautiful.

ANONACEÆ.

No. 9. *Anona.*—Custard Apple.—Southern Florida. Discovered by Dr. Chapman in South Florida. It grows 15 to 20 feet high. The fruit is small and eatable when fully ripe. The species is undetermined.

No. 10. *Asimina triloba*, Dunal.—Papaw.—From Pennsylvania southward. A small tree, very common in the Southern States, less frequent at the North. It produces an oblong pulpy fruit about 4 inches long, which when ripe has a rich luscious taste.

CAPPARIDACEÆ.

No. 11. *Capparis Jamaicensis*, Jacq.—Caper Tree.—South Florida. A shrub or small tree of South Florida, also growing in the West Indies. The true capers of commerce are the fruit of the Old World species.

CANELLACEÆ.

No. 12. *Canella alba*, Swartz.—White Wood; Wild Cinnamon.—South Florida. A small tree in South Florida. In the West Indies, it is abundant, and called Wild Cinnamon and White Wood. The bark is aromatic and tonic, and is much employed in medicine.

TAMARISCINEÆ.

No. 13. *Fouquiera splendens*, Eng.—Western Texas and Arizona. Grows in Western Texas, and thence westward to Southern California. In our borders, it is usually only a shrub; but in Mexico it grows 20 to 30 feet high, and on account of its spiny branches is used for hedges and fences.

GUTTIFERÆ.

No. 14. *Clusia flava.*—South Florida. A West Indian tree, said to have been found in Florida, but not recently observed.

TERNSTROMIACEÆ.

No. 15. *Gordonia Lasianthus*, L.—Loblolly Bay.—Southern States. A tree 30 to 50 feet high, growing in swamps near the sea-coast from North Carolina to Florida and Louisiana. The leaves are evergreen; the flowers showy white, and sweet-scented. The bark is much employed in tanning, as a substitute for oak-bark.

No. 16. *Gordonia pubescens*, L'H.—Mountain Bay.—Southern States. A small tree rarely over 30 feet high, found in Georgia and Florida, and quite rare. It has been introduced into cultivation, and is hardy as far north as Philadelphia. When in bloom, it is beautiful, and it flowers continuously for two or three months.

TILIACEÆ.

The Tilias in Europe are called Lime trees, or Linn. Our species are commonly called Basswood. They are large trees, and have a wide range, being found probably in every State east of the Rocky Mountains. It is, however, not abundant, except in some localities. The wood is white and soft, and is employed to some extent in the manufacture of furniture, &c.

No. 17. *Tilia Americana*, L.—Basswood; Linden. Eastern United States.

No. 18. *Tilia heterophylla*, Vent.—White Basswood. Eastern United States.

No. 19. *Tilia pubescens*, Ait.—White basswood. Eastern United States.

ZYGOPHYLLACEÆ.

No. 20. *Guaiacum sanctum*, L.—Lignum Vitæ.—South Florida. A small tree, quite rare in South Florida, but common in the West Indies. It is very similar to, and has the same properties as the *G. officinale* of the West Indies, which furnishes the gum resin called guaiacum, which is a common stimulative aromatic medicine. The wood is much heavier than water.

ZANTHOXYLACEÆ.

No. 21. *Zanthoxylum Americanum*, Mill.—Prickly Ash; Toothache Tree.—Northeastern United States. A shrub or small tree. The bark is very hot and aromatic, and is somewhat used medicinally.

No. 22. *Zanthoxylum Carolinianum*, Lam.—Southern Prickly Ash.—Southern States. A small tree found from South Carolina to Florida and westward. The bark is aromatic and tonic. The young stems are spiny, and the old ones more or less covered with tubercles, which have developed from the spines.

No. 23. *Zanthoxylum Floridanum*, Nutt.—Satin Wood.—South Florida.

No. 24. *Zanthoxylum Pterota*, H. B. K.—False Iron Wood; Yellow Wood.—The Gulf States. A small shrubby tree occurring from Florida to Texas. The wood is yellow and close-grained.

No. 25. *Ptelea trifoliata*, L.—Hop-tree.—Eastern United States. This is seldom more than a tall shrub. The fruit, a wafer-like seed, grows in clusters, is a bitter tonic, and has been used as a substitute for hops.

No. 26. *Ptelea angustifolia*, Benth.—Narrower-leaved than the preceding.—Rocky Mountains; Texas to California.

SIMARUBIACEÆ.

No. 27. *Simaruba glauca*, DC.—Quassia; Bitter-wood.—South Florida. Found in South Florida by Dr. Blodgett. It occurs in the West Indies with another species, the *Simaruba amara*, the bark of which is medicinal, and possesses the same properties as quassia.

BURSERACEÆ.

No. 28. *Bursera gummifera*, Jacq.—West India Birch; Gummo Limbo.—South Florida. The largest of South Florida trees, abounding in gum.

No. 29. *Amyris Floridana*, Nutt.—Torch Wood.—South Florida. Mostly a shrub, but becoming a small evergreen and elegant tree.

OLACINEÆ.

No. 30. *Ximenia Americana*, L.—Hog Plum.—South Florida. Mostly shrubby, but sometimes 20 feet high. It bears a drupe the size of a plum, which is yellow and pleasant-tasted.

MELIACEÆ.

No. 31. *Melia Azederach*, L.—Pride of India; Bread Tree.—Naturalized in Southern States. A native of Persia, but quite freely naturalized in some parts of the South. It is there one of the commonest ornamental trees. The wood is of a reddish color, solid, durable, and taking a beautiful finish.

ILICINEÆ.

No. 32. *Ilex opaca*, Ait.—Evergreen Holly.—Southern States. In favorable localities, this tree attains a pretty large size, frequently 40 feet high, and 12 to 15 inches diameter. The wood is very heavy, compact, and fine-grained. It is employed in some parts of cabinet-work. It very closely resembles the European Holly.

No. 33. *Ilex Dahoon*, Walt.—Dahoon Holly.—Southern States.

No. 34. *Ilex decidua*, Walt.—Deciduous Holly.—Southern States.

No. 35. *Ilex monticola*, Gr.—Holly.—Southern States.

CELASTRINEÆ.

No. 36. *Schæfferea frutescens*, Jacq.—Crab-wood; False Box.—South Florida. A small tree of South Florida; the wood is close and fine-grained, and is said to be exported from the West Indies as a kind of box-wood.

No. 37. *Euonymus occidentalis*, Nutt.—California Spindle Tree.—California.

No. 38. *Euonymus atropurpureus*, Jacq. — Waahoo. — Southern and Western States.

RHAMNACEÆ,

No. 39. *Frangula Caroliniana*, Gr.—Alder Buckthorn.—Virginia and southward.

No. 40. *Frangula Purshiana*, DC. — Oregon Buckthorn. — Western coast.

No. 41. *Frangula Californica*, Gr.—California Coffee-tree.—Western coast. This much resembles the *F. Caroliniana*. In California, the berries of this species have been employed to some extent as a substitute for coffee. Some persons recommend it; others have been made sick by its use.

No. 42. *Ceanothus thyrsiflorus*, Esch. — California Lilac. — Western coast. One of the most showy shrubs or small trees of California.

No. 43. *Ceanothus divaricatus*, Nutt.—California.

No. 44. *Zizyphus obtusiflorus*, Gr. — Texas Jujube-tree. — Texas and westward.

No. 45. *Seutia ferrea*, Brong.—South Florida.

SAPINDACEÆ.

No. 46. *Æsculus glabra*, Willd.—Ohio Buckeye.—Tennessee and Western States. This tree attains, in favorable situations, 20 to 30 feet height, and is much in use as an ornamental tree. It is not found wild east of the Alleghany Mountains; its favorable locality being the banks of the western rivers, in Ohio, Illinois, and Kentucky. The wood is light, soft, and useless. The nuts are said to be poisonous to cattle eating them.

No. 47. *Æsculus flava*, Ait.—Sweet Buckeye.—Southern States. This tree prevails more to the southward than the Ohio Buckeye. It is abundant in the mountainous districts of North and South Carolina and Georgia. In favorable situations, it frequently attains a height of 50 to 60 feet, and the trunk a diameter of 2 to 3 feet. The flowers are of a light agreeable yellow and quite ornamental. The wood is soft and perishable.

No. 48. *Æsculus Pavia*, L.—Red Buckeye.—Southern States. This species has nearly the same range as the preceding, but is usually only a shrub of 8 or 10 feet height; sometimes, however, becoming a small tree.

No. 49. *Æsculus Californica*, Nutt.—California Buckeye.—California. This is the only buckeye of the Pacific coast. It forms a low, spreading, bushy tree from 15 to 20 feet high.

No. 50. *Ungnadia speciosa*, Endl.—Spanish Buckeye.—Texas and westward. This is a large shrub or small tree, a native of Texas and New Mexico. The chestnut-like fruits have an agreeable, sweet taste, but are strongly emetic. The foliage resembles that of the hickory, (*Carya.*)

No. 51. *Sapindus marginatus*, Willd.—Soap Berry.—Southern States. This tree varies from 20 to 40 feet in height. It occurs along the coast

in Georgia and Florida, also in Arkansas and Texas. The berries are smaller than those of the next species, but, like that, the black hard nuts of the berries are sometimes strung for beads and crosses.

No. 52. *Sapindus Saponaria*, L.—White Wood.—South Florida. This species was found by Dr. Chapman in South Florida. In the West Indies, the berries and the roots are used as a substitute for soap. The berries are also used to intoxicate fish.

No. 53. *Hypelate paniculata*, Don.—Madeira Wood.—South Florida. A small tree found in South Florida. The wood is very like mahogany, and is highly valued.

No. 54. *Acer saccharinum*, Wang.—Sugar Maple; Hard Maple.—Eastern United States. The well-known Sugar Maple, from the sap of which in the Northern States and in Canada large quantities of sugar and sirup are made annually. It is one of the noblest of American trees, both for the value of its wood and the beauty of its form and foliage. It is much employed as an ornamental tree.

No. 55. *Acer saccharinum*, Wang., var. *nigrum*, Gr.—Black Sugar Maple.—Eastern United States. This variety differs little from the common form except in a darker wood.

No. 56. *Acer dascycarpum*, Ehrh.—Silver-leaf Maple.—Eastern United States. One of the most beautiful of maples; much used as a shade-tree on account of its rapid growth and beautiful foliage.

No. 57. *Acer rubrum*, L.—Red Maple.—Eastern United States. More compact in form and less rapid in growth than the preceding, but, like it, a favorite for street-planting and ornament.

No. 58. *Acer Pennsylvanicum*, L.—Striped-bark Maple.—Northeastern United States. A small tree, the young bark with longitudinal stripes of green and black. Rare and little known outside of the Northeastern States.

No. 59. *Acer macrophyllum*, Pursh.—Oregon Maple.—California and Oregon. This occurs in the mountainous districts of California and Oregon. In Oregon, it attains a large size, and the wood abounds in that peculiarity of grain which is called Bird's-eye and Curled Maple. For cabinet purposes, it is thought to be equal to mahogany.

No. 60. *Acer circinatum*, Pursh.—Vine Maple.—Oregon and Washington Territory. This species has a low and frequently reclining or prostrate trunk, which sends forth branches, at first upright, then bending down to the ground, and forming almost impenetrable thickets.

No. 61. *Acer grandidentatum*, Nutt.—Great-toothed Maple.—California and Oregon. A small tree or shrub of the Rocky Mountains.

No. 62. *Negundo aceroides*, Moench.—Box Elder.—Eastern United States. This is a fine ornamental tree, of rapid growth, not commonly growing more than 20 to 30 feet high It is rare east of the Alleghanies, but found along all the rivers of the West, reaching into Kansas, Missouri, and Nebraska, and even northward into Minnesota and the British possessions. The sap contains a large amount of sugar. The wood is fine and close-grained, and has been used in cabinet-work.

No. 63. *Negundo Californica*, T. & G.—California Box Elder.—California. This species is confined to the Pacific coast. It does not seem to differ greatly from the preceding species.

No. 64. *Staphylea trifoliata*, L.—Bladder Tree.—Eastern United States. A large shrub or small tree 10 to 15 feet high, with trifoliate leaves and peculiar 3-lobed bladdery pods.

ANACARDIACEÆ.

No. 65. *Rhus typhina*, L.—Staghorn Sumac.—Eastern United States. The Sumacs are large shrubs or small trees mostly with pinnate leaves.

The leaves and young twigs are employed in tanning, and are thought to be equal in strength to those of the Sicilian Sumac.

No. 66. *Rhus glabra*, L.—Smooth Sumac.—Eastern United States.

No. 67. *Rhus microphylla*, Eng.—Small-leaved Sumac.—Texas and Southwest.

No. 68. *Rhus copallina*, L.—Dwarf Sumac.—Eastern United States.

No. 69. *Rhus Metopium*, L.—Coral Sumac.—South Florida. This grows in South Florida, where it attains a height of 20 to 30 feet. It is very poisonous. In the West Indies, it is called Mountain Manchineel and Burnwood.

No. 70. *Rhus venenata*, DC.—Poison Sumac.—Eastern United States.

No. 71. *Rhus integrifolia*, Nutt.—One-leaved Sumac.—South California. This species and the succeeding do not have pinnate leaves. They are found in Southern California. The red berries of this species are used by the Indians to make a cooling acid drink.

No. 72. *Rhus Laurina*, Nutt.—Laurel Sumac.—South California. A low spreading tree, much branched and very leafy, and exhaling to a considerable distance an aromatic odor. The flowers are somewhat showy, and the plant would be fine in cultivation.

No. 73. *Pistacia Mexicana*, H. B. K.—Mexican Pistacia-tree.—Texas.

No. 74. *Schinus molle*, L.—Pepper Tree.—Southwestern United States. Cultivated as an ornamental tree in California and in Mexico. It is probably introduced. The berries have the taste of black pepper.

VITACEÆ.

No. 75. *Vitis æstivalis*, Michx.—Summer Grape.—Eastern United States.

No. 76. *Vitis cordifolia*, Michx.—Winter or Frost Grape.—Eastern United States.

LEGUMINOSÆ.

No. 77. *Robinia Pseudocacia*, L.—Common Locust.—Pennsylvania and southward. Hardly found north of the fortieth degree of latitude except in cultivation. It is chiefly found in the Alleghanies and the mountainous parts of Kentucky and Tennessee. It is a beautiful tree, attaining a height of 50 feet and upward. The wood is hard, compact, and very durable, much used in ship-building.

No. 78. *Robinia viscosa*, Vent.—Clammy Locust.—Virginia and southward. A smaller tree than the preceding, and much more rare, being confined to the mountains of Georgia and North Carolina.

No. 79. *Robinia Neo-Mexicana*, Gray.—New Mexican Locust.—New Mexico and Arizona. A small tree, rarely exceeding 20 feet. Very thorny. Grows in stony ravines at the foot of mountains in New Mexico and Arizona.

No. 80. *Olneya tesota*, Gray.—Palo de Hierro.—New Mexico and Arizona.

No. 81. *Piscidia Erythrina*, L.—Jamaica Dogwood.—South Florida. A tolerably large tree of South Florida; also grows in the West Indies. Its blossoms resemble those of the Locust. The wood is heavy, coarse-grained, and durable.

No. 82. *Cladrastris tinctoria*, Raf.—Yellow Wood.—Tennessee and Kentucky. This is one of the handsomest flowering-trees of the Locust kind. It grows chiefly in the mountainous regions of Kentucky and Tennessee. The wood is yellow, and has been used in domestic dyeing.

The tree rarely exceeds 40 feet in height and 1 foot in diameter. It is well worthy of cultivation.

No. 83. *Sophora affinis*, T. & G.—Texas and Southwest.

No. 84. *Sophora speciosa*, Benth.—Texas and Southwest. Our two Sophoras are small trees of Texas and New Mexico, seldom over 6 inches in diameter. They produce an abundance of showy flowers very early in the season. The *Sophora speciosa* has evergreen leaves, and beautiful red beans, which are said to be poisonous.

No. 85. *Gymnocladus Canadensis*, Lam.—Kentucky Coffee-tree.—Eastern United States. A tall, large, and handsome tree, rare in Western New York, Pennsylvania, and the States north of the Ohio River; more common in Kentucky and southwestward. The wood is very compact and close-grained, and valuable for cabinet-work. The large beans of the pods have been used for coffee.

No. 86. *Gleditschia triacanthos*, L.—Honey Locust.—Eastern United States. This is a large and handsome tree; the trunk and branches generally beset with long and formidable spines, on which account it has been employed as a hedge-plant. The long pods contain a sweetish pulp, and have been used in fermenting a kind of beer, but are of no practical value. The wood is heavy, and affords excellent fuel, but is not considered durable as a timber. The tree is rare in the Atlantic States, but rather common west of the Alleghanies, in Tennessee, Kentucky, and the tributaries of the Ohio and Mississippi.

No. 87. *Gleditschia monosperma*, Walt.—Water Locust.—Illinois and southward. This is a smaller tree than the preceding, growing in swamps in the Southern States and in the vicinity of the Ohio River. The pods are short, roundish, and only one-seeded. The tree is thorny, like the Honey Locust.

No. 88. *Cercidium floridum*, Benth.—Green-bark.—Western Texas and Arizona. This is the Palo Verdi of the Mexicans and the Green-barked Acacia of American travelers. The bark is smooth and green on the young trees. It is a small, wide-spreading tree, with many branches, rarely seen a foot through, and 20 to 30 feet high.

No. 89. *Parkinsonia aculeata*, L.—Jerusalem Thorn.—Western Texas and Arizona. Mostly a shrub; quite ornamental, and frequent in cultivation in the region bordering on Mexico.

No. 90. *Parkinsonia microphylla*, Torr.—Western Texas and Arizona.

No. 91. *Cercis Canadensis*, L.—Redbud or Judas Tree.—Eastern United States. The Redbuds are small trees; very ornamental. This species is frequent east of the Mississippi. The next is found principally on the Pacific coast.

No. 92. *Cercis occidentalis*, Torr.—Western Redbud.—Western United States.

No. 93. *Prosopis glandulosa*, T. & G.—Mesquit.—Texas to California. A scrubby, small tree, seldom more than 25 to 30 feet high; sometimes constituting extensive forests. It produces an abundance of bean-like pods, which contain a sweet pulp. Both beans and pulp are eaten by Indians and often by whites, but they are used chiefly as food for horses, which eat them with avidity. The wood is very hard and durable, dark brown, and resembles mahogany. Fences made of this timber are very durable. The wounded bark in spring exudes a gum of the same quality as gum arabic.

No. 94. *Strombocarpus pubescens*, Gr.—Screw-bean.—Texas and westward. This tree is very similar to the preceding, but of smaller size. The pods are two to three inches long, and twisted like a screw. They

are eaten by the Colorado Indians, powdered to a coarse meal, and made into a kind of bread. They are also good food for horses.

No. 95. *Leucæna retusa*, Gr.—Texas and westward.

No. 96. *Acacia Farnesiana*, Willd.—Texas and westward.

No. 97. *Pithecolobium Unguis-Cati*, Benth.—Cat's-claw.—South Florida. In South Florida, mostly a shrub, rarely a small tree. The bark has medicinal properties.

ROSACEÆ.

No. 98. *Prunus Americana*, Marsh.—Wild Yellow or Red Plum.—Eastern United States. This is the common wild plum of the country east of the Rocky Mountains, from Mississippi to Minnesota. In the valley of the Mississippi, and particularly southwestward, the two next named species also occur.

No. 99. *Prunus rivularis*, Scheele.—Wild Plum.—Mississippi Valley and westward.

No. 100. *Prunus Chicasa*, Michx.—Chickasaw Plum.—Southeastern United States.

No. 101. *Prunus umbellata*, Ell.—Small Wild Plum.—South Carolina and southward. A small purple or black plum, sour and bitter, growing from South Carolina to Florida.

No. 102. *Prunus Pennsylvanica*, L.—Wild Red Cherry.—Eastern United States. A small tree, or often a shrub, with sour, unpleasant fruit.

No. 103. *Prunus serotina*, Ehrh.—Wild Black Cherry.—Eastern United States. A fine, large tree, of wide range, frequent in the Northern and Western States, and along the Alleghany Mountains in the Southern States. The wood is compact, fine-grained, and highly esteemed for cabinet-work. The fruit is small, rather sweet and pleasant when fully ripe.

No. 104. *Prunus Virginiana*, L.—Choke-cherry.—Eastern United States.

No. 105. *Prunus Caroliniana*, Ait.—Mock Orange.—North Carolina and southward. A small tree with evergreen leaves, growing from North Carolina to Florida and in the Gulf States. It closely resembles the Cherry Laurel of Europe. It is a beautiful tree for cultivation, but probably would not bear a northern climate.

No. 106. *Prunus demissa*, Walp.—Rocky Mountain Choke-cherry.—Rocky Mountains and California.

No. 107. *Prunus Andersonii*, Gr.—Desert Plum.—California and Nevada.

No. 108. *Prunus ilicifolia*, Nutt.—Holly-leaved Cherry.—California.

No. 109. *Prunus mollis*, Doug.—Oregon. This is the principal wild cherry of Oregon and the northwestern coast. It grows to the height of 20 to 30 feet. The fruit is astringent and unpleasant.

No. 110. *Nuttallia cerasiformis*, T. & G.—California.

No. 111. *Adenostoma sparsiflora*, Torr.—Chimisell.—California.

No. 112. *Cercocarpus ledifolius*, Nutt.—Mountain Mahogany.—Rocky Mountains. A low, spreading tree, not usually over 10 to 15 feet high, but sometimes 40 feet high, and 2½ feet thick. The leaves are evergreen; the wood is a dark red, like mahogany, extremely compact and heavy. It is frequent on the mountains of Utah, Nevada, and California.

No. 113. *Cercocarpus parvifolius*, Nutt.—Small Mountain Mahogany.—California. A much smaller tree or shrub than the preceding; the wood quite similar.

No. 114. *Pyrus coronaria*, L.—American Crab Apple.—Eastern United States. The common wild crab apple of the United States, growing in glades and frequently forming extensive thickets. The fruit is variable,

but seldom palatable or serviceable. It is used, however, in new portions of the country for preserves or for making cider.

No. 115. *Pyrus angustifolia*, Ait.—Narrow-leaved Crab.—Pennsylvania southward and westward. Perhaps only a variety of the preceding, with narrower leaves and rather smaller fruit.

No. 116. *Pyrus Americana*, DC.—American Mountain Ash.—Northeastern United States. A small tree growing in swamps and mountain woods, sparingly in the Alleghany Mountains, most common in New England and northward. It is frequently seen in cultivation, and much resembles the European Mountain Ash. The clusters of bright-red berries are very ornamental, and remain on the tree until winter.

No. 117. *Pyrus rivularis*, Doug.—Oregon Crab Apple.—Oregon and Rocky Mountains. This is a small tree, ranging from California northward into Alaska. The fruit is of the size of a cherry, of an agreeable flavor, and used, particularly in Alaska, by the natives of the country for food.

No. 118. *Cratægus spathulata*, Michx.—Wild Thorn.—Virginia and southward. Of wild thorns, we have numerous species, most of which are small and shrubby. About twelve species and varieties of the country east of the Rocky Mountains may be counted as small trees, and two of the Rocky Mountains and western coast.

No. 119. *Cratægus apiifolia*, Michx.—Wild Thorn.—Virginia and southward.

No. 120. *Cratægus cordata*, Ait.—Washington Thorn.—Virginia and southward.

No. 121. *Cratægus arborescens*, Ell.—Wild Thorn.—Southern States.

No. 122. *Cratægus coccinea*, L.—Scarlet-fruited Thorn.—Eastern United States.

No. 123. *Cratægus tomentosa*, L.—Black or Pear Thorn.—Eastern United States.

No. 124. *Cratægus tomentosa*, L., var. *punctata*, Gr.—Black Thorn.—Eastern United States.

No. 125. *Cratægus tomentosa*, L., var. *mollis*, Gr.—Wild Thorn.—Eastern United States.

No. 126. *Cratægus Crus-galli*, L.—Cockspur Thorn.—Eastern United States.

No. 127. *Cratægus æstivalis*, T. & G.—Wild Hawthorn.—Southern States.

No. 128. *Cratægus flava*, Ait.—Summer Haw.—Virginia and southward.

No. 129. *Cratægus glandulosa*, Michx.—Wild Hawthorn.—Virginia and southward.

No. 130. *Cratægus rivularis*, Doug. — Western Hawthorn. — Rocky Mountains.

No. 131. *Cratægus sanguinea*, Pallas.—Oregon Thorn.—Oregon.

No. 132. *Photinia arbutifolia*, Lindl.—Laurel Hawthorn.—California. A beautiful evergreen shrub or small tree of the Pacific coast. It sometimes attains the height of 20 or 25 feet and a thickness of trunk of 12 or 15 inches.

No. 133. *Amelanchier Canadensis*, T. & G.—Service or June Berry.—Eastern United States. Usually a small tree, but sometimes becoming 30 to 40 feet high, with a diameter of 10 or 12 inches. It is found mostly by the banks of mountain-streams. There are several varieties.

No. 134. *Amelanchier alnifolius*, Nutt.—Service Berry.—Rocky Mountains. This is usually a shrub; in Oregon and Washington Territory, it is said to be a small tree, yielding abundance of berries, which are largely employed as food by the Indians.

HAMAMELACEÆ.

No. 135. *Liquidambar styraciflua*, L.—Sweet Gum or Bilsterd.—Eastern United States. A large and beautiful tree, with singular star-like leaves, somewhat resembling the maple. It grows in the Atlantic States in rich, low woods; also in the Mississippi Valley, but not far north of the Ohio. The wood is compact and fine-grained, but not durable. It is a fine ornamental tree, and deserving of cultivation.

RHIZOPHORACEÆ.

No. 136. *Rhizophora Mangle*, L.—Red Mangrove.—South Florida. Commonly a low, spreading tree in South Florida, also in Louisiana and on the coast of Texas. On the Thousand Islands, it attains a height of 40 to 60 feet. All the low keys along the coast are covered by this tree. It sends down roots from its germinating fruits, which take root upon reaching the earth, and thus forms an impenetrable thicket like the Banyan tree of India.

COMBRETACEÆ.

No. 137. *Conocarpus erecta*, Jacq.—White Button Wood.—Florida. A small tree of the West Indies and South Florida. It furnishes almost the only fuel used in South Florida, and extends north as far as Ancelote Keys.—(Dr. Chapman.)

No. 138. *Laguncularia racemosa*, Gært.—Black Button Wood.—South Florida. Found by Dr. Chapman in South Florida; a small tree everywhere; is a mere shrub, except among the Thousand Islands and north of Cape Sable, where it forms a large tree.

MYRTACEÆ.

No. 139. *Eugenia buxifolia*, Willd.—Iron Wood.—South Florida. The Eugenias are in Florida small trees, reaching 20 to 25 feet in height. They belong to the Myrtle family, and the flowers of some species are very fragrant. The wood is close-grained, hard, and applicable to cabinet-work.

No. 140. *Eugenia monticola*, DC.—Iron Wood.—South Florida.

No. 141. *Eugenia procera*, Poir.—Iron Wood.—South Florida.

No. 142. *Eugenia dichotoma*, DC.—Stopper Wood.—South Florida.

No. 143. *Psidium pyriforme*, L.—Guava.—South Florida. The Guava is a well-known fruit in the West Indies, where it is highly esteemed, and eaten either raw or formed into preserves. Dr. Chapman found the tree extensively naturalized at Tampa Bay, Florida.

CACTACEÆ.

No. 144. *Cereus giganteus*, Eng.—Tree Cactus.—Western Texas and Arizona. The specimens for this order are from Southern Arizona, where they are striking and characteristic features of the country. The *Cereus giganteus* grows 50 to 60 feet in a straight column, and finally divides into several naked-looking branches. The wood of this and other large Cacti presents a singular net-work of fibers in distinct layers.

No. 145. *Cereus Thurberi*, Eng.—Thurber's Cactus.—Western Texas and Arizona.

No. 146. *Opuntia arborescens*, Eng.—Tree Opuntia.—Western Texas and Arizona.

ARALIACEÆ.

No. 147. *Aralia spinosa*, L.—Angelica Tree or Hercules's Club.—Eastern United States.

CORNACEÆ.

No. 148. *Cornus florida*, L.—Flowering Dogwood.—Eastern United States. This is usually a small tree, but sometimes acquires a height of 40 or 50 feet, and a diameter of trunk of 1½ feet. It flowers in spring before the full development of the leaves, and then presents a beautiful appearance. It deserves to be more generally cultivated.

No. 149. *Cornus Nuttallii*, Aud.—White Dogwood.—California and Oregon. This species, which is confined to the Pacific coast, has rather larger flowers than the preceding, and is perhaps more showy. The wood of both is hard and valuable. Grows sometimes 50 or 60 feet high.

No. 150. *Cornus pubescens*, Nutt.—Western Dogwood.—California and Oregon. This rarely becomes a small tree, 25 to 30 feet high, on the Pacific coast. We have five or six other species of dogwood which do not attain tree size.

No. 151. *Garrya Fremontii*, Torr.—Tassel-tree.—Oregon and California. The Garryas are mostly shrubs, though under favorable circumstances the *Garrya elliptica* gains a height of 20 to 30 feet.

No. 152. *Garrya elliptica*, Lindl.—Satin Tassel-tree.—California.

No. 153. *Nyssa multiflora*, Wang.—Black or Sour Gum; Pepperidge.—Eastern United States. A middle-sized tree, growing from Massachusetts to Illinois and southward. The fibers of the wood are so interwoven that it is almost impossible to split it; hence it is used for wheel-hubs, rollers, and cylinders.—(Bryant.) It is quite ornamental in cultivation.

No. 154. *Nyssa aquatica*, L.—Water Tupelo.—Southern States. This species grows in low wet ground, chiefly in the Southern States, but is found also in New Jersey and Pennsylvania. The wood is very tough, and has been used in the manufacture of wooden bowls, &c.

No. 155. *Nyssa uniflora*, Walt.—Large Tupelo.—Virginia and southward. This is the largest tree of the genus. It is confined to the Southern States, growing in swamps. It bears a dark-blue plum-like fruit nearly an inch long. The wood is soft and extremely light. The roots are also extremely light and soft, and have been used as a substitute for cork. The wood is only used to make bowls and trays.

No. 156. *Nyssa capitata*, Walt.—Ogeechee Lime.—Southern United States. This species is found in swamps in Georgia and Florida and westward near the coast. It bears an oblong red plum-like fruit, which is agreeably acid, and can be employed as a substitute for the lemon. The tree is small and the wood without value.

CAPRIFOLIACEÆ.

No. 157. *Sambucus glauca*, Nutt.—California Elder.—California and Rocky Mountains. This species of elder in California forms a low tree, sometimes 30 feet high, with a stem 2 feet in diameter. Indians and birds eat the berries.

No. 158. *Viburnum prunifolium*, L.—Black Haw.—Eastern United States. The haws are small trees or large shrubs, with smooth glossy leaves and handsome flowers. They are worthy of cultivation.

No. 159. *Viburnum Lentago*, L.—Sweet Viburnum or Sheepberry.—Eastern United States.

No. 160. *Viburnum obovatum*, Walt.—Wild Haw.—Virginia and southward.

RUBIACEÆ.

No. 161. *Cephalanthus occidentalis*, L., var. *Californica*.—Button-bush. —California. This is seldom more than a shrub; but in California it sometimes grows 25 to 30 feet high, with a trunk 12 to 20 inches in diameter.

No. 162. *Guettarda Blodgettii*, Suttle.—South Florida.

No. 163. *Randia clusiæfolia*, Chap.—Seven-years Apple.—South Florida.

No. 164. *Pinckneya pubens*, Michx.—Georgia Bark.—South Carolina to Florida. A small tree in the lower districts of Georgia and in Florida, rarely exceeding the height of 25 feet and a diameter of 6 inches. The bark is extremely bitter, and has been employed in the treatment of intermittent fevers. It is closely related botanically to the Cinchona, which furnishes the Peruvian bark of commerce.

ERICACEÆ.

No. 165. *Vaccinium arboreum*, Marshall.—Farkleberry.—Virginia and southward. A shrub or small tree sometimes 20 feet high, growing from Virginia and Southern Illinois southward.

No. 166. *Oxydendrum arboreum*, DC.—Sourwood or Sorrel-tree.—Pennsylvania and southward. This tree grows chiefly in the mountainous districts of the Alleghanies from Pennsylvania southward. In fertile valleys, at the foot of the mountains, in North Carolina and Tennessee, it attains a height of 50 feet. The common name sour-tree is derived from the acidity of its leaves. The flowers are white, and in spikes 5 or 6 inches long. They are very ornamental, and begin to be produced when the tree is 5 or 6 feet high.

No. 167. *Kalmia latifolia*, L.—Calico-bush or Mountain Laurel.—Pennsylvania and southward. A beautiful evergreen shrub, sometimes attaining the size of a small tree. It is very ornamental and deserving of cultivation.

No. 168. *Rhododendron maximum*, L.—Rose Bay or Great Laurel.—Pennsylvania and southward. Like the preceding, an evergreen shrub of great beauty. It has been much improved by cultivation.

No. 169. *Rhododendron Californicum*, Hook.—California Rhododendron.—Pacific coast.

No. 170. *Arbutus Menziesii*, Pursh.—Madrone-tree.—California and Oregon.

No. 171. *Arbutus Texana*.—This species or variety grows in Texas. It is mostly a large shrub; sometimes, however, becoming 25 feet high and 8 or 10 inches in diameter. The leaves are smaller and the flowers less panicled than in the California species. The timber is said to be almost imperishable.

No. 172. *Arctostaphylos glauca*, Lindl.—Manzanita.—Oregon and California. There are several species of this genus on the western coast, mostly shrubs or small trees, which have been much confused. The specimen under this number is from Southern California, and has a large drupe-like fruit, with a consolidated nut. These berries are pleasant to the taste, and much employed as food by the Indians of that region.

No. 173. *Arctostaphylos tomentosa*, Doug.—Manzanita.—California and Rocky Mountains.

No. 174. *Arctostaphylos pungens*, H. B. K.—Manzanita.—California and Rocky Mountains.

STYRACACEÆ.

No. 175. *Halesia diptera*, L.—Snowdrop-tree.—Georgia and Florida. The Snowdrop-trees are found in the Southern States from the Ohio River southward, near the Alleghanies, and on river-banks in Georgia and Florida. They are usually smallish trees, but sometimes grow 40 or 50 feet high, and 1½ to 2 feet in diameter. They are very desirable for ornamental trees, producing a profusion of white bell-shaped flowers, even when quite small.

No. 176. *Halesia tetraptera*, L.—Silverbell-tree.—Virginia and Southward.

No. 177. *Symplocos tinctoria*, L'Her.—Horse Sugar or Sweet-leaf.—Virginia and southward. A small tree with oblong evergreen leaves, and clustered racemes of small white flowers. It grows in low, damp woods and pine barrens in North Carolina, Georgia, and Florida, and attains a height of 12 to 20 feet, with a diameter of 8 to 10 inches. It is one of the most beautiful trees of the southern forest.—(Nuttall.)

CYRILLACEÆ.

No. 178. *Cyrilla racemiflora*, Walt.—Iron-wood.—North Carolina and southward.

No. 179. *Cliftonia ligustrina*, Banks.—Buckwheat-tree.—Georgia and southward. An elegant small tree, growing from 10 to 20 feet high, of about the same range as the preceding. It is evergreen, and exceedingly ornamental when in flower. After flowering, the tree presents a curious appearance, from the abundance of triangular winged capsules, resembling buckwheat, from which the tree receives its popular name.

EBENACEÆ.

No. 180. *Diospyros Virginiana*, L.—Persimmon.—Eastern United States. A well-known tree, most common in the Southern States, but growing as far north as New York. It grows from 30 to 60 feet high, with a very hard fine-grained wood, which has been used for various purposes. It bears a plum-like fruit an inch or more in length, which when fully ripe is edible and palatable.

No. 181. *Diospyros Texana*, Schul.—Black Persimmon.—Western Texas. This is called Sapote-pieto by the Mexicans and Black Persimmon by the Americans. It is a shrub or middle-sized tree, often with a black, ebony-like core. The fruits are black, and of the size of a cherry and larger, melting, and very sweet.—(Dr. Lindheimer.)

SAPOTACEÆ.

No. 182. *Sideroxylon pallidum*, Spreng.—Mastic.—South Florida. A middle-sized tree of South Florida called Mastic, probably from the production of a gum resembling mastic.

No. 183. *Dipholis salicifolia*, A. D C.—South Florida.

No. 184. *Chrysophyllum microphyllum*, Jacq.—Golden-leaf.—South Florida. A small tree of the West Indies, found by Dr. Chapman last fall in South Florida. The leaves have a beautiful, golden, satin-like surface on the under side.

No. 185. *Mimusops Sieberi*, A. DC. — Naseberry. — South Florida. This is one of the trees called Naseberry in the West Indies. It is common in South Florida, where it becomes a large tree. Dr. Chapman

invariably found the large trunks to be hollow. The fruit is delicious and highly flavored.

No. 186. *Bumelia lycioides*, Gært.—Iron-wood.—Kentucky and southward. The Bumelias are shrubs or small trees, of no special value.

No. 187. *Bumelia parvifolia*, A. D C.—Iron-wood.—South Florida.

No. 188. *Bumelia lanuginosa*, Pers.—Iron-wood.—Southern States.

No. 189. *Bumelia tenax*, Willd.—Iron-wood.—Southern States.

No. 190. *Bumelia reclinata*, Vent.—Iron-wood.—Texas and westward.

THEOPHRASTACEÆ.

No. 191. *Jacquinia armillaris*, L.—Currant-trees.—South Florida. A small tree of South Florida and the West Indies. The wood is curiously grained.

MYRSINACEÆ.

No. 192. *Myrsine Floridana*, A. DC.—South Florida.—Mostly a shrub, rarely a small tree.

No. 193. *Ardisia Pickeringii*, T. & G.—South Florida.—Mostly a shrub, but on the keys a small tree. It is an evergreen tree, with laurel-like leaves, and panicles of showy-white purple-tinged flowers.

BIGNONIACEÆ.

No. 194. *Catalpa bignonioides*, Walt.—Catalpa.—Southern States. A tree well known in cultivation, and hardy as far north as latitude 41°. It is native in the Southern and Southwestern States and in Southern Illinois and Indiana. It attains a height of 50 or 60 feet, and a diameter of 1½ to 2 feet. The leaves are large, and the flowers showy, and when in bloom the tree is extremely ornamental. The wood is light, but of a fine texture, and capable of receiving a fine polish. It is said to be very durable.

No. 195. *Chilopsis linearis*, DC.—Texas and Arizona. Usually a shrub, but sometimes attaining a height of 25 feet. It has long willow-like leaves, and is very ornamental when in flower.

No. 196. *Tecoma radicans*, Juss.—Trumpet-vine.—Southern States. This beautiful woody vine sometimes acquires a woody trunk of a foot in diameter or more.

VERBENACEÆ.

No. 197. *Citharexylum villosum*, Jacq.—Fiddle-wood.—South Florida. Rarely a small tree, of no economic value.

No. 198. *Avicennia tomentosa*, Jacq.—Black Mangrove.—South Florida. This and the next species are called Black Mangrove, observed by Dr. Chapman at Cedar Keys and the Thousand Islands. They are low evergreen trees, forming impenetrable thickets on the muddy shores of the sea.

No. 199. *Avicennia oblongifolia*, Chap.—Black Mangrove.—South Florida.

Order BORRAGINACEÆ.

No. 200. *Cardia bullata*, L.—South Florida.

No. 201. *Ehretia Buerreria*, L.—South Florida.

No. 202. *Ehretia elliptica*.—Texas.—Mostly shrubby, but sometimes a tree 2 feet in diameter; fruit an orange-yellow berry, of the size of a pea; much liked by children and birds. The evergreen rough leaves are used to rub and destroy eruptions of the skin.—(Dr. Lindheimer.)

OLEACEÆ.

No. 203. *Olea Americana*, L.—Devil-wood; American Olive.—Southern States. This is a small evergreen tree, with thick, leathery leaves, and small, white, fragrant flowers. It is related to the olive-tree of the eastern world, but its fruit has no value. It is impossible to split, and hence the vulgar name of Devil-wood.

No. 204. *Chionanthus Virginica*, L.—Fringe-tree.—Middle and Southern States.

No. 205. *Fraxinus Americana*, L.—White Ash.—Eastern United States. A large and valuable tree ranging over the eastern portion of the United States. The wood is tough and elastic, and much employed in various manufactures. It is a handsome and ornamental tree.

No. 206. *Fraxinus pubescens*, Lam.—Red Ash.—Eastern United States. A smaller tree than the preceding, perhaps more common. The wood is said to be equally as valuable as that of the White Ash.

No. 207. *Fraxinus viridis*, Michx.—Green Ash.—Western States. A middle-sized tree, of vigorous and rapid growth, and the wood has the same qualities as the preceding.

No. 208. *Fraxinus sambucifolia*, Lam.—Black Ash.—Northern and Western States. A large tree, usually growing in moist soil, and hence often called Swamp Ash. The wood is more elastic than that of any other species. It splits easily into thin, narrow strips, which are used for making baskets and hoops for barrels.

No. 209. *Fraxinus quadrangulata*, Michx.—Blue Ash.—Western States. This species is not found in the Atlantic States. It is found from Ohio to Wisconsin and southward to Kentucky and Tennessee. It is a large tree, growing from 60 to 70 feet high, with a diameter of 2 feet or more. The wood is quite as valuable as that of the White Ash, and is said to be much more durable when exposed to the weather; hence its value for fence-rails, posts, &c.

No. 210. *Fraxiuus platycarpa*, Michx.—Carolina Water Ash.—Southern States. This species grows in swamps or marshy banks of rivers. It is usually 25 or 30 feet high, but sometimes becomes a large tree. The wood is remarkably light and soft, and probably has no economic value.

No. 211. *Fraxinus Curtissi*, n. sp.?—Southern States. Mr. Curtiss found at Eufaula, Ala., a large ash with remarkably small fruit. This species is provisionally called *F. Curtissi.* It requires further investigation.

No. 212. *Fraxinus Oregona*, Nutt.—Oregon Ash.—California and Oregon. The common ash of the Pacific coast. It grows 60 to 70 feet high. Is of equal value with the White Ash of the Eastern States.

No. 213. *Fraxinus dipetala*, H. and A.—California Flowering Ash.—California and Oregon.

No. 214. *Fraxinus pistaciæfolia*, Torr.—Texas and westward.

No. 215. *Fraxinus anomala*, Torr.—Single-leaf Ash.—Utah and Arizona. This ash is seldom more than a shrub 10 to 15 feet high, growing in ravines among the foot-hills of Southern Utah and Arizona. The leaves are simple, not pinnate, as in the other species.

No. 216. *Fraxinus coriacea*, Watson.—Thick-leaved Ash.—Utah and Arizona. A smallish tree, with thick, leathery leaves, growing in Southern Utah and Arizona.

No. 217. *Forestiera acuminata*, Poir.—Southwestern States.—A large shrub or small tree, of no economic value.

No. 218. *Forestiera ligustrina*, Poir.—Southern States.

NYCTAGENIACEÆ.

No. 219. *Poisonia obtusata*, Swartz.—South Florida. A small tree of Florida and the West Indies.

POLYGONACEÆ.

No. 220. *Coccoloba uvifera*, Jacq.—Sea-side Grape.—South Florida. This and the following species are low and spreading trees, along the coast in Florida and the West Indies. It is remarkable for the grape-like clusters of pear-shaped purple berries, which have an agreeable subacid taste, and which are much employed. The wood is heavy, hard, and valuable for cabinet-work.

No. 221. *Coccoloba Floridana*, Meisner.—Sea-side Grape.—South Florida.

LAURACEÆ.

No. 222. *Persea Carolinensis*, Nées.—Red Bay.—Southern States. This species occurs from Southern Virginia to Florida and the Gulf States. It is found in the vicinity of swamps and swampy river-borders. In favorable situations, it grows to 50 or 60 feet high and 15 to 20 inches in diameter. The leaves are large, shining, and evergreen. The wood is of a beautiful rose-color, of a fine, compact grain, and finishes almost equal to mahogany.

No. 223. *Persea Catesbyana*, Chap.—Catesby's Bay.—South Florida.

No. 224. *Sassafras officinale*, Nées.—Sassafras.—Eastern United States. This tree is found over a large portion of the United States. It is usually a small tree, but sometimes attains a large size. The wood is not very strong, but is fine-grained and durable. It is valuable for cabinet-work. The bark of the root has a spicy, aromatic taste, and has some reputation as a medicine.

No. 225. *Oreodaphne Californica*.—California Myrtle.—California and Oregon. The California Laurel is a fine ornamental evergreen tree, growing in open places from 50 to 60 feet high. In thick woods, it has been found shooting up to 100 or 120 feet. The leaves have a very pungent odor, which produces headache in some persons. The wood is very beautiful, and is used for fine cabinet-work.

ELEAGNACEÆ.

No. 226. *Shepherdia argentea*.—Buffalo-berry.—Rocky Mountains. A large shrub or small tree, growing in thickets on the banks of streams in the Rocky Mountain valleys. The scarlet berries have an agreeable taste, and are employed as food by the natives.

EUPHORBIACEÆ.

No. 227. *Hippomane Mancinella*, L.—Manchineel.—South Florida.

No. 228. *Stillingia sebifera*, Michx.—Tallow-tree.—Naturalized in the Southern States. The Tallow-tree is a native of China, but has become extensively naturalized in the East and West Indies, and also in several of the Southern States along the sea-coast. In its native country, its seeds and pods are bruised and then boiled, which causes a kind of tallow to rise to the surface. This tallow is much employed in making candles.

No. 229.—*Excœcaria lucida*, Swartz.—Poison-wood.—South Florida.

No. 230. *Drypetes crocea*, Poir.—A small tree of South Florida and the West Indies. The leaves are evergreen, and have muchthe flavor of tea.

No. 231. *Drypetes glauca*, Vahl.—South Florida.

URTICACEÆ.

No. 232. *Morus rubra*, L.—Red Mulberry.—Eastern United States. The Red Mulberry is found throughout the greater part of the United States east of the Mississippi, and also in some of the States west of that river.—(Bryant.) It is commonly a smallish tree, sometimes, however, attaining a large size. The berries are quite palatable, are eaten eagerly by birds, and also have a place in the markets as a second-rate fruit. The wood is strong, compact, and extremely durable.

No. 233. *Morus parvifolia*, Buck.—Small-leaved Mulberry.—Texas and westward.

No. 234. *Maclura aurantiaca*, Nutt.—Osage Orange.—Arkansas and Southwest. This tree, which is native in Arkansas and Texas, has been quite generally introduced over the country, chiefly from its extensive employment as a hedge-plant. The early French settlers called it *Bois d'arc*, or Bow-wood, from its use by the Indians for bows. The fruit is of the size and color of a large orange, but is not edible. The wood is very hard, elastic, fine-grained, and durable.

No. 235. *Ficus aurea*, Nutt.—Gum-tree; Wild Fig.—South Florida. There are many species of wild fig in the West Indies, but this species of South Florida has not been identified with any of them. It is a large tree, full of milky juice, which forms a kind of India rubber, whence it is also called Gum-tree. The fruit is very small and insignificant.

No. 236. *Ficus pedunculata*, Willd.—Wild Fig.—South Florida. This tree is also a native of the West Indies, and, like the Banyan of the West Indies, it sends downward aërial roots, which become fixed in the soil. The fruit is larger than the preceding, being the size of a large cherry.

No. 237. *Ficus brevifolia*, Nutt.—Wild Fig.—South Florida.

No. 238. *Ulmus Americana*, L.—White Elm.—Eastern United States. One of our most common and valuable trees, very popular as a shade-tree on account of its graceful form. It is one of the largest of the deciduous trees of the United States, attaining sometimes the height of 100 feet. The wood is employed for various purposes, but it is not considered durable when exposed to the weather.

No. 239. *Ulmus fulva*, Michx.—Slippery Elm.—Eastern United States. This is usually a smaller tree than the White Elm. It is not as much esteemed as an ornamental tree. The wood, however, is said to be of better quality and more durable. The inner bark is very mucilaginous, and is in extensive use for medical and surgical purposes.

No. 240. *Ulmus racemosa*, Thomas.—Corky White Elm.—Northern States. This tree is limited to the northern portions of the United States, being found sparingly in New England, New York, and westward to northern Illinois and Wisconsin. It closely resembles the White Elm, but may be distinguished by the corky wings of the smaller branches, which cause them to look grotesque and rough. Dr. S. H. Wright, of Penn Yan, N. Y., says it grows as rapidly as the White Elm, and he thinks will become as large. He has seen some young trees over two feet in diameter. The wood is tougher and finer-grained than the White Elm.

No. 241. *Ulmus alata*, Michx.—Winged Elm.—Southern and Western

States. This species does not grow in the Northern States except on the line of the Ohio River. It is a smallish tree, and has smaller leaves than the other kinds. The branches have a broad and thin corky wing on the opposite sides. The wood is finer-grained and more compact than the White Elm.

No. 242. *Ulmus Floridana*, Chap.—Florida Elm.—Florida.

No. 243. *Ulmus crassifolia*, Nutt.—Thick-leaved Elm.—Texas and Southwest.

No. 244. *Planera aquatica*, Gmel.—Planer-tree.—Southern States. This tree is found in the Southern States and in Kentucky and Tennessee. It is a tree of medium size, with foliage somewhat like that of the European Elm. It is not a common tree, and the wood is not known to be applied to any useful purpose.

No. 245. *Celtis occidentalis*, L.—Sugar or Hackberry.—Eastern United States. This tree is rare in the New England States, but rather common in the southern and western ones. There are several varieties, one of which is usually a low and straggling bush. In the Western States, it often becomes a lofty tree. It somewhat resembles the elm in foliage and the ash in bark. It produces a dryish kind of berry about the size of a pea. The wood is white, but is not considered durable.

No. 246. *Celtis Mississippiensis*, Bosc.—Mississippi Hackberry.—Mississippi Valley.

No. 247. *Celtis reticulata*, Torr.—Net-leaved Hackberry.—Texas and Southwest. This is a western species, occuring in Texas and the Rocky Mountain region. It is a small tree, often a mere shrub.

No. 248. *Celtis pallida*, Torr.—Pale-leaved Hackberry.—Texas.

PLATANACEÆ.

No. 249. *Platanus occidentalis*, L.—Sycamore; Plane-tree.—Eastern United States. This is probably the largest deciduous tree in the United States. It occurs throughout the Eastern, Southern, and Western States, and extends beyond the Mississippi River. In the rich bottom-lands of the western rivers, it sometimes attains the enormous circumference of 40 to 45 feet. It much resembles the European Plane-tree, and is thought to possess a richer foliage, and to afford a deeper shade. As a timber-tree it is of little value, as the wood is liable to warp, and decays early.

No. 250. *Platanus racemosa*, Nutt.—California Sycamore.—California. This is the sycamore of the Pacific coast, extending from Central California to Mexico. Although a large tree, it does not attain the size of the eastern species. The wood is said to be more valuable, receiving a good polish and being more durable.

No. 251. *Platanus Wrightiana*, S. W.—Wright's Sycamore.—Arizona

JUGLANDACEÆ.

No. 252. *Juglans nigra*, L.—Black Walnut.—Eastern United States. This tree occurs in the Atlantic States, but attains its greatest perfection and abundance in the valleys of the Ohio and Mississippi. It has been so much in request for the timber that it is much less common than formerly. The wood is used for the inside finish of houses, for cabinet-work, for gun-stocks, and many other purposes. It produces a nut much like the English walnut, but of stronger oily flavor. They are greatly relished by many persons.

No. 253. *Juglans cinerea*, L.—Butternut; White Walnut.—Eastern

United States. This is more limited in range than the preceding. In Pennsylvania, New York, and New England, it probably attains its greatest perfection. It is a smaller tree than the Black Walnut. It is also found in the Western States. The wood is of a light-brown color, fine-grained, and easily worked. Although less valuable than the Black Walnut, the wood is well adapted to many uses. The nuts are not as highly esteemed as those of the Black Walnut.

No. 254. *Juglans Californica*, S. W.—California Walnut.—California. The California Walnut attains, in favorable situations, a height of 50 to 75 feet, and a diameter of 2 to 3 feet. It does not seem to be abundant, and we know nothing respecting the value of its wood. It has recently been distinguished as a different species from the walnut of Arizona and New Mexico.

No. 255. *Juglans rupestris*, Eng.—Small Black Walnut.—Texas and Arizona.

No. 256. *Carya olivæformis*, Nutt.—Pecan-nut.—Mississippi Valley. This tree grows in the valley of the Mississippi and its tributaries, on the Arkansas, the Missouri, the Illinois, the Wabash, and the Ohio, for some two hundred miles above its mouth. The wood is coarse-grained, heavy, and compact. It is a beautiful tree, with a straight and well-shaped trunk. The nut is well known in the markets, and is thought by some to be superior in flavor to any other nut known.

No. 257. *Carya alba*, Nutt.—Shell-bark Hickory.—Eastern United States. This species becomes a lofty tree, 80 feet high, with a diameter sometimes of 2 feet. It is one of the most valuable of the hickories for timber and for fuel. It furnishes most of the hickory-nuts of commerce. They are pleasant-flavored and highly esteemed. On large trees, the bark shells off in long narrow plates, whence the common name of the tree. The wood is heavy, elastic, and strong, and for handles of axes and agricultural implements, and many other uses, it is unequaled. There is little difference in the quality and value of many of the different species of hickory.

No. 258. *Carya sulcata*, Nutt.—Western Shell-bark.—Western States.

No. 259. *Carya tomentosa*, Nutt.—Mocker-Nut.—Eastern United States.

No. 260. *Carya amara*, Nutt.—Bitter-nut.—Eastern United States. This is a large tree, growing from 60 to 70 feet high. The timber is said to be inferior to the preceding species, and the nuts are thin-shelled bitter, and worthless.

No. 261. *Carya porcina*, Nutt.—Pig-nut Hickory.—Eastern United States. A large tree, with small pear-shaped fruit, the nuts bitterish and unpalatable. The wood is tough and valuable.

No. 262. *Carya microcarpa*, Nutt.—Small-fruited Hickory.—Eastern United States.

No. 263. *Carya myristicæformis*, Michx.—Nutmeg Hickory.—Southern States. This species grows in swamps in the Southern States. The fruit resembles a nutmeg, whence the name of Nutmeg Hickory. It is somewhat like that of the Bitter-nut tree, but much thicker.

No. 264. *Carya aquatica*, Nutt.—Swamp Hickory.—Southern States. A species growing in swamps in the Southern States, with astringent, bitter fruit, and brittle, worthless timber.

CUPULIFERÆ.

No. 265. *Quercus macrocarpa*, Michx—Bur Oak Overcup Oak.—Western States This species is rare in the Eastern States, but com-

mon in Michigan, Illinois, Wisconsin, and Minnesota. It is a large tree, and when growing on low ground assumes a rounded and handsome form. It has very large acorns, which are usually deeply immersed in the cup; the border of the cup fringed with loose scales The wood is open and brittle as it occurs in the prairie country, but valuable for fuel.

No. 266. *Quercus alba*, L.—White Oak.—Eastern United States. This is one of the noblest, largest, and most useful oaks of this country. The wood is strong, compact, and durable, and is only second to that of the Live Oak. It is extensively employed in ship-building, in manufacturing, and for many purposes.

No. 267. *Quercus lyrata*, Walt.—Southern Overcup Oak.—Southern States. This much resembles the Bur Oak, but is chiefly confined to the Southern States.

No. 268. *Quercus stellata*, Wang.—Post Oak.—Eastern United States. This species grows mostly upon poor clay lands. It is a middle-sized tree; the wood is yellowish, strong, fine-grained, and more durable than the White Oak.

No. 269. *Quercus bicolor*, Willd.—Swamp White Oak.—Eastern United States.

No. 270. *Quercus Michauxii*, Nutt.—Michaux's Oak.—Southeastern United States.

No. 271. *Quercus Prinus*, L.—Chestnut Oak.—Eastern United States. Of this species there are several varieties. It is usually a large and lofty tree. Its timber is inferior to that of the White Oak in strength, but is still very valuable for many uses.

No. 272. *Quercus Prinus*, L., var. *monticola*, Michx.—Rock Chestnut Oak.—New England and Middle States.

No. 273. *Quercus Prinus*, L., var. *acuminata*, Michx.—Yellow Chestnut Oak.—Northern and Western States.

No. 274. *Quercus Douglasii*, Hook. & Arn.—Douglas's Oak.—Rocky Mountains and California. This and the next two succeeding species are the California White Oaks, extending into Oregon and Columbia. They are probably of equal value with the eastern species.

No. 275. *Quercus Garryana*, Hook.—Garry's Oak.—California and Oregon.

No. 276. *Quercus lobata*, Nées.—California White Oak.—California.

No. 277. *Quercus undulata*, Torr.—Rocky Mountain Oak.—Rocky Mountains. This is the common oak of the Rocky Mountains, usually small and scrubby, but sometimes forming a moderate-sized tree. It is very variable in the foliage.

No. 278. *Quercus densiflora*, Hook. & Arn.—California Tan-bark Oak.—California. This is an anomalous species of California, between an oak and a chestnut. In open ground, it is a beautiful, spreading, pyramidal tree, with a trunk sometimes 5 to 6 feet in diameter. Among the forest-trees, it rises to 100 feet or more in height.

No. 279. *Quercus agrifolia*, Nées.—California Field Oak.—California. This is commonly known in California as Evergreen Oak. It grows usually in open grounds, with a wide, spreading, apple-tree-like top. It is usually a small tree, sometimes a mere shrub, and occasionally becoming 40 or 50 feet high.

No. 280. *Quercus chrysolepis*, Liebm.—Cañon Live Oak.—California. An evergreen oak, growing in rocky cañons and on mountain-sides. It is sometimes shrubby; sometimes like the last, becoming 40 or 50 feet high. It furnishes the hardest oak-wood of the Pacific coast, and is used in making ox-bows, ax-handles, &c.

No. 281. *Quercus oblongifolia*, Torr.—Oblong-leaved Oak.—Arizona and California.

No. 282. *Quercus Emoryi*, Torr.—Emory's Oak.—Arizona.

No. 283. *Quercus hypoleuca*, Eng.—New Mexican Oak.—Arizona.

No. 284. *Quercus Durandii*, Buckly.—Durand's Oak.—Texas. This species approaches the Post Oak in general characters. The leaves are variable, being sometimes lobed, and sometimes entire.

No. 285. *Quercus Phellos*, L.—Willow Oak.—Southern States. This species is confined to the States bordering the Atlantic and the Gulf; not, however, extending into the New England States. It is remarkable for its narrow, willow-shaped leaves. The wood is strong, but coarse-grained, and not durable.

No. 286. *Quercus virens*, Ait.—Live Oak.—Southern States. This is the famous Live Oak. It grows from Southern Virginia to Florida and westward in the vicinity of the sea-coast. The wood is more esteemed for ship-building than any other. It is evergreen, and is a large tree, with spreading branches.

No. 287. *Quercus cinerea*, Michx.—Upland Willow Oak.—Southern States. A small tree, growing in sandy pine-barrens from North Carolina to Florida. It is evergreen, with leaves like the Willow Oak, but thicker, and downy on the under surface.

No. 288. *Quercus imbricaria*, Michx.—Shingle Oak.—Eastern United States. A middle-sized tree, reaching to 50 or 60 feet high, and with a diameter of 1½ to 2 feet. It grows principally, in open situations, from New Jersey to Illinois and southward. Its foliage is handsome, resembling that of the Laurel. The wood is coarse-grained, and not durable.

No. 289. *Quercus aquatica*, Catesb.—Water Oak.—Southern States. A middle-sized tree, of the Southern States, growing on the borders of swamps. The leaves are perennial, of variable form, but always broadest at the upper portion and tapering to a point at the base.

No. 290. *Quercus laurifolia*, Michx.—Water Oak.—Southern States.

No. 291. *Quercus nigra*, L.—Black Jack.—Eastern United States. A small, scrubby tree, growing usually in poor clay soil. It is found in New Jersey, Maryland, and southward, as also in some of the Western States. The wood furnishes a good fuel, but is too coarse-grained and perishable for any use in the arts.

No. 292. *Quercus falcata*, Michx.—Spanish Oak.—Eastern United States. A large tree, attaining 80 feet or more in height, and sometimes 4 feet in diameter. It has about the same range as the Black Jack, not being found in New England nor in the northern part of the Western States. The wood is not valuable except for fuel.

No. 293. *Quercus Catesbaei*, Michx.—Turkey Oak.—Southern States. A small tree, with foliage much like the preceding. It is found in Florida, Georgia, and North and South Carolina. The wood is good fuel, but of no value as timber.

No. 294. *Quercus rubra*, L.—Red Oak.—Eastern United States. This is one of the largest oaks of our country, and is diffused over all the eastern portion of the United States, but more especially to the northward. It is a beautiful tree, with reddish, coarse-grained wood, which is little used in the arts except for barrel-staves.

No. 295. *Quercus coccinea*, Wang.—Scarlet Oak.—Eastern United States. The Scarlet and Quercitron Oaks do not differ much in their characters, and, indeed, are considered but as varieties of one species. They form large and handsome trees, and the bark furnishes a yellow dye which is used in the arts.

No. 296. *Quercus tinctoria*, Bart.—Quercitron Oak.—Eastern United States.

No. 297. *Quercus palustris*, Du Roi.—Pin Oak.—Eastern United States. A rather smaller tree than the preceding. The leaves are small, smooth, of a pleasant green color, very similar to those of the Scarlet Oak. The wood is stronger and more durable than that species. It is chiefly limited to the Northern States.

No. 298. *Quercus Sonomensis*, Benth.—California Oak.—California. This species of California is nearly related to the *Quercus rubra* of the Eastern States. It grows in mountainous districts, and forms a pretty large tree.

No. 299. *Quercus Wislizenii*, DC.—California Live Oak.—California. A smallish tree of California, with bright-green persistent leaves, sometimes called Live Oak.

No. 300. *Quercus dumosa*, Nutt.—Dwarf Oak.—California. This is a common dwarf oak in Southern California.

No. 301. *Quercus reticulata*, H. B. K.—Dwarf Oak.—Southern Arizona.

No. 302. *Castanea vesca*, L., var. *Americana*, Gr.—American Chestnut.—Eastern United States. One of the noblest trees of American forests. It occurs from Massachusetts to Michigan, and in the mountainous districts of Pennsylvania, Virginia, and Tennessee, but not on the prairie regions of the Western States. The wood is strong, elastic, and durable, and is largely employed in the manufacture of furniture and for the inside finish of railroad-cars and steamboats. The nuts are very sweet and palatable, and always command a good price in the markets.

No. 303. *Castanea pumila*, Michx.—Chincapin.—Southern States. This may be called a dwarf chestnut, growing from New Jersey and Pennsylvania to Florida. Northward it is only a large shrub, but in South Carolina and Florida it becomes a tree of 30 to 40 feet high and 12 to 15 inches diameter. The wood equals that of the chestnut, but the nuts, although generally eaten by children, are not comparable to those of the former.

No. 304. *Castanopsis chrysophylla*.—California Chestnut.—California. A tree of Oregon and California, becoming 60 to 100 feet high and 2 to 3 feet diameter. The bur is scarcely one-third as large as in the common chestnut, with shorter prickles. The shell of the nut is almost as large as the filbert.

No. 305. *Castanopsis chrysophylla*, var. *pumila*.—California Chincapin.—California. This is mostly a shrub growing on open mountain-sides, and is sometimes called California Chincapin.

No. 306. *Fagus ferruginea*, Ait.—Beech.—Eastern United States. The Beech is one of our loftiest trees, sometimes reaching the height of 100 feet. It grows from Canada to the Gulf of Mexico. It is wanting in the prairie districts of the West. The wood is hard, fine-grained, and compact. It is largely used for shoe-lasts and handles of tools. It is also employed in the frame-work of buildings. The wood is in great repute as fuel. The nuts have a delicious flavor, but are too small to make them of much economic importance.

No. 307. *Carpinus Americana*, Michx.—Blue Beech.—Eastern United States. A small tree 15 to 20 feet high. The wood is white, compact, and fine-grained.

No. 308. *Ostrya Virginica*, Willd.—Hop Hornbeam; Ironwood.—Eastern United States. The Ironwood is a small tree, but sometimes grows to a height of 40 feet. The wood is heavy and fine-grained, and is used for mallets, wedges, levers, &c. Its growth is very slow.

No. 309. *Corylus rostrata*, var. *Californica*.—California.

MYRICACEÆ.

No. 310. *Myrica cerifera*, L.—Bayberry; Wax Myrtle.—Eastern United States. A shrub or small tree growing near the sea-coast. The berries are coated with a waxy secretion, which is sometimes utilized in the domestic manufacture of candles and also in medicinal unguents.

No. 311. *Myrica inodora*, Bart.—Florida Bayberry.—Florida.

No. 312. *Myrica Californica*, Cham.—California Bayberry or Myrtle.—California. This species sometimes attains a height of 40 feet, with a trunk 2 feet in diameter. It grows on the Pacific coast, from Puget Sound to Mexico.

BETULACEÆ.

No. 313. *Betula alba*, var. *populifolia*, Spach.—American White Birch.—Northern and Northeastern United States. A small and slender graceful tree, 15 to 25 feet high, growing from Maine to Pennsylvania, and sparsely on the great lakes.

No. 314. *Betula papyracea*, Ait.—Canoe Birch; Paper Birch.—Northern and Northeastern United States. A large and handsome tree, growing to the height of 70 feet, and with a diameter of 3 feet. It is limited to the northern portions of the country, ranging from Maine to Wisconsin on the northern border, and extending far northward into Canada. It has a brilliant white bark, from which Indians and traders construct canoes. The thin, external sheet of the bark forms the basis of a great variety of Indian fancy-work.

No. 315. *Betula lutea*, Michx.—Yellow Birch.—Northern and Northeastern United States. This is a beautiful large tree, growing in moist woods on our northern border. The wood is strong, fine-grained, and makes handsome furniture.

No. 316. *Betula lenta*, L.—Cherry Birch; Black Birch.—Northern and Northeastern United States. This, like the preceding, is a large tree, chiefly of our northern borders, but extending also along the Alleghany region southward. The bark and twigs are highly aromatic. The wood is of a rosy hue, fine-grained, and valuable for cabinet-work and for timber.

No. 317. *Betula nigra*, L.—River Birch; Red Birch.—Eastern United States. This becomes a large tree in favorable situations. It is found along the banks of rivers from Eastern Massachusetts southward to Florida, and westward to Kentucky, Illinois, and Iowa. The wood is similar to that of the preceding.

No. 318. *Betula occidentalis*, Hook.—Western Birch.—Rocky Mountains. This species is a small tree, rarely over 25 feet high and 6 inches in diameter. It is found in the Rocky Mountains, along streams; in Colorado, Utah, &c.

No. 319. *Alnus incana*, Willd.—Speckled Alder.—Northeastern United States. A shrub, or small tree, growing along streams in New England, New York, and northward. Of no particular value.

No. 320. *Alnus rhombifolia*, Nutt.—California Alder.—California.

No. 321. *Alnus Oregona*, Nutt.—Oregon Alder.—California and Oregon. On the Pacific coast, in California and Oregon. Often becoming a large tree, 60 to 80 feet high, with a trunk 2 feet in diameter.

SALICACEÆ.

No. 322. *Salix nigra*, Marshall.—Black Willow.—Eastern United States. This is almost the only willow of the eastern portion of the

continent which attains a tree size. It grows from 20 to 30 feet high, with a thick black bark. On the Pacific coast are several species which become tree willows.

No. 323. *Salix nigra*, var. *Purshiana.*—Willow.—Texas.

No. 324. *Salix longifolia*, Muhl., var.—California Long-leaved Willow.—California.

No. 325. *Salix Wrightiana*, Aud.—Wright's Willow.—Texas.

No. 326. *Salix lasiolepis*, Benth.—Willow.—California.

No. 327. *Salix lucida*, Hook., var.—California Shining Willow.—California.

No. 323. *Populus tremuloides*, Michx.—American Aspen.—Eastern United States and Rocky Mountains. A small tree of the northern border and Canada, also found on mountain-sides through the Rocky Mountains.

No. 329. *Populus grandidentata*, Michx.—Great-toothed Aspen.—Eastern United States. This is a larger tree than the preceding, common in the Northern States, and extending southward along the Alleghany Mountains. It much resembles the European Silver Poplar.

No. 330. *Populus monilifera*, Ait.—Cottonwood.—Eastern United States and Rocky Mountains. This and the next species of cottonwoods have a wide range throughout most parts of the United States. Some botanists consider them to be but forms of one species. They are large, rapidly-growing trees, particularly abundant in the prairie regions and western river-banks, extending even to the Pacific Ocean. The wood is light and soft, much employed in some of the Western States for building purposes, and for inside work of houses, under the name of Whitewood and Cottonwood.

No. 331. *Populus angulata*, Ait.—Cottonwood.—Southern States.

No. 332. *Populus heterophylla*, L.—Swamp Cottonwood.—Eastern United States. This species prevails in the Southern States, but extends northward as far as Delaware and Southern Illinois. It is a large tree, growing chiefly in swampy woods, and little valued.

No. 333. *Populus balsamifera*, L.—Balsam Poplar.—Northern and Western United States. This species grows mostly in northern latitudes, being found in New England and Northern New York, also in the Rocky Mountains. It is a large tree; a variety of it is in cultivation.

No. 334. *Populus angustifolia*, James.—Willow-leaved Cottonwood.—Rocky Mountains. This is now considered to be a variety of the preceding. It is found principally along streams in the Rocky Mountains, where it is called Cottonwood, sometimes Willow-leaved Cottonwood.

No. 335. *Populus trichocarpa*, Torr.—Cottonwood.—California.

CONIFERÆ.

No. 336. *Pinus Banksiana*, Lamb.—Banks's Pine; Scrub Pine.—Wisconsin to New England. This species is found from the northern parts of the United States nearly to the Arctic Ocean, and from Labrador to the Saskatchawan. In Wisconsin it becomes a middle-sized tree, and is used for timber when the trees are found of sufficient size.

No. 337. *Pinus contorta*, Dougl.—Twisted pine.—Rocky Mountains. This tree is found in the Rocky Mountains from Colorado to Oregon. It differs widely in regard to size in different localities. Near the Pacific coast it is often low and scrubby, bearing cones at 5 feet high. In Colorado it is found at an altitude of 7,000 feet, and attains a height of 50 feet.

No. 338. *Pinus contorta*, Doug., var. *Bolanderi.*—Bolander's Pine.—

California. This variety in the Sierra Nevada Mountains at an altitude of 5,000 to 9,000 feet attains a height of 150 to 200 feet. It is variously called Tamarack, Twisted Pine, or Black Pine.

No. 339. *Pinus inops*, Ait.—Jersey Pine; Scrub Pine.—Eastern United States. A straggling tree 15 to 40 feet high, with spreading or drooping branches. It abounds in New Jersey, Maryland, and Virginia, also on the rocky hills bordering the Ohio in Kentucky, Southern Illinois, and Indiana. The wood is of little value.

No. 340. *Pinus mitis*, Michx.—Yellow Pine.—Eastern United States, chiefly south. This is a handsome tree, growing from New England to Wisconsin, and sparingly in Missouri, Kentucky, Tennessee, and south ward to Florida. The timber is very valuable, commanding a higher price even than the white pine.

No. 341. *Pinus clausa*, Chap.—Florida. A small tree found by Dr. Chapman at Apalachicola, related to *Pinus inops*.

No. 342. *Pinus glabra*, Walt.—Spruce Pine.—South Carolina and southward. A tree 40 to 60 feet high, with smoothish bark and soft white wood, branching from near the ground. Resembles *P. mitis;* grows from South Carolina to Florida.

No. 343. *Pinus resinosa*, Ait.—Red Pine.—Massachusetts to Wisconsin. A tree 50 to 80 feet high, with reddish bark, growing from Pennsylvania northward through Canada and Nova Scotia, also in Wisconsin and Michigan. The wood is compact, strong, and durable, and for some uses is preferable to the white pine. It is also an excellent ornamental tree.

No. 344. *Pinus Elliottii*, Eng.—Elliott's Pine.—South Carolina and southward.

No. 345. *Pinus pungens*, Michx.—Table Mountain Pine.—This species grows on the Alleghany Mountains from Pennsylvania southward; abundant in some parts of Virginia and North Carolina. A tree of 40 or 50 feet height, and of very vigorous and rapid growth.

No. 346. *Pinus muricata*, Don.—Bishop's Pine.—California. A small tree 30 to 40 feet high; grows near the coast north and south of San Francisco, and in other localities in that State.

No. 347. *Pinus edulis*, Eng.—Piñon Nut Pine.—Rocky Mountains. A low tree with a spreading habit, growing in Colorado and Utah, and in New Mexico, Arizona, and Southern California. It is universally known by the Mexican name of Piñon. It has an edible nut, which is much used as food by the Indians, and the wood is rich in resin, making it excellent fuel.

No. 348. *Pinus monophylla*, Torr.—Nut Pine.—Sierra Nevada Mountains. This species is almost limited to the eastern slope of the Sierra Nevada Mountains, at altitudes of 2,000 to 6,000 feet. It is a small tree of 20 to 40 feet height. The seeds are eagerly collected for food by the Washoe and other Indians. The wood is excellent fuel.

No. 349. *Pinus Parryana*, Eng.—Nut Pine.—Near the Mexican border southwest.

No. 350. *Pinus ponderosa*, Dougl.—Yellow Pine.—Rocky Mountains. A very variable pine; several of its extreme forms have been considered different species. It occurs in Colorado, Utah, and the Black Hills of Wyoming. It is remarkable for its heavy wood, which makes excellent lumber. It is generally called Yellow Pine.

No. 351. *Pinus ponderosa*, Doug., var. *Benthamiana*, Hart.—Sappy Pine.—California. This variety grows in the Sierra Nevada Mountains, in damp valleys, and near streams. It is generally slender and tall,

with low limbs, black bark, and sappy, tough wood. Used for building-timber, flooring, &c. It has several names, as Swamp Pine, Sappy Pine, Black Pine, and Bull Pine.

No. 352. *Pinus ponderosa*, Doug., var. *Jeffreyi*, Balf.—Jeffrey's Pine.—California. This variety also grows on the Sierra Nevada Mountains, and on the Coast Range of California. It often attains a height of 170 to 250 feet and a diameter of 6 to 10 feet. It differs much in the quality of the wood, but is used for all the purposes of other kinds. It is remarkable for the comparatively large size of its cones. It is called Yellow Pine, Pitch Pine, and Truckee Pine.

No. 353. *Pinus australis*, Michx.—Long-leaved Pine.—South Carolina and southward. A lofty tree, growing in the pine-barrens of the Southern States, attaining a height of 75 to 100 feet. Next to the White Pine, this is perhaps the most valuable of the genus. The timber plays an important part in ship-building, is extensively used as a flooring, and in house-building. The chief value of this species is for the turpentine, tar, pitch, and rosin which it supplies, and of which immense quantities are exported in addition to the home supply.

No. 354. *Pinus Coulteri*, Doug.—Coulter's Pine.—California. A large tree of California, from 80 to 100 feet in height, with large, spreading branches, and a trunk 3 or 4 feet in diameter. The cones are heavier than those of any other of the family, being frequently 1 foot long and 6 inches diameter, and weighing from 4 to 6 pounds. The large, nut-like seeds contained in the cones are nutritious, and used as an article of food by the Indians.

No. 355. *Pinus Sabiniana*, Doug.—Hard-nut Pine; Sabine's Pine.—California. Grows on the foot-hills of the Coast Range and on the western foot-hills of the Sierra Nevada Mountains of California. It is not very abundant, and is limited by the altitude of 4,000 feet. It grows from 40 to 100 feet high. The cones are large and heavy, and full of oily, nutritious nuts, which are used by the Indians. The timber is fit only for fuel. It is called Digger Pine, Foothill Pine, Gray-leaved Pine, &c.

No. 356. *Pinus Torreyana*, Parry.—Torrey's Pine.—California. A species of Southern California, resembling the preceding, but smaller. The nuts are thick-shelled, but nutritious, and used as food by the Indians.

No. 357. *Pinus insignis*, Dougl.—Monterey Pine.—California. Grows along the coast south of San Francisco. Some old trees near Monterey are 70 or 80 feet high. It is quite an ornamental species, and is in frequent cultivation in California.

No. 358. *Pinus radiata*, Don.—California.

No. 359. *Pinus tuberculata*, Don.—Prickly-coned Pine.—California. A small tree seldom attaining a greater height than 30 to 40 feet, with a trunk of 8 or 10 inches diameter. It grows on the Coast Hills south of San Francisco, and in other places in the State.

No. 360. *Pinus rigida*, Miller.—Pitch Pine.—Eastern United States. A medium-sized tree from 30 to 70 feet high, with dark, rugged-looking bark, and hard, resinous wood. The wood is knotty, and of little value for lumber, but gives an intense heat in burning on account of the quantity of resin which it contains.

No. 361. *Pinus serotina*, Michx.—Pond Pine.—Southern States. This is closely related to the preceding, and is by some considered only a variety of it. It grows on the borders of ponds and swamps from Florida to North Carolina.

No. 362. *Pinus Tæda*, L.—Loblolly; Old-field Pine.—Southern States. A species confined to the Atlantic States, growing mostly in damp or in light, barren soil, frequently taking possession of old and neglected

fields. It is variable in height, sometimes rising to 70 or 100 feet high. The timber is said to be valuable, though less so than that of *P. australis*.

No. 363. *Pinus aristata*, Eng.—Prickly-coned Pine.—Rocky Mountains. This species was first found in Colorado near Pike's Peak, but it is now considered to be synonymous with the next.

No. 364. *Pinus Balfouriana*, Jeffrey.—Balfour's Pine.—Rocky Mountains. The specimen is from Southern Utah, and grows on high, barren, sandstone mountains; it grows about 50 to 60 feet high. The tree is distinguished by its long branches, which are heavy, causing the ends to hang down. The tree is compact in appearance and of very dark-green color. It is thought by some that the tree of Oregon, which has been described under this name, is a different species.

No. 365. *Pinus flexilis*, James.—Bull Pine.—Rocky Mountains. This is the prevailing pine of the East Humboldt Mountains, Nevada, and frequent in the Wasatch. It also grows in Colorado and on the San Francisco Mountains of Arizona. In the Wasatch Mountains it is found at high altitudes on limestone ledges, and has a branched and knotty habit, rendering it unfit for lumber. It is called by the inhabitants Bull Pine. It is a middle-sized tree, usually 30 to 50 feet high, but recorded by Fendler as 60 to 80 feet high near Santa Fé.

No. 366. *Pinus albicaulis*, Eng.—White-barked Pine.—Rocky Mountains. This species, although closely related to the preceding, is believed to be different. It grows only at extreme altitudes. It grows on the Cascade Mountains of Oregon, on alpine peaks in the Sierra Nevada Mountains, and on high mountains in Idaho and Montana. The name is suggested by the color of the bark of the tree, which Dr. Engelman says is as white as milk.

No. 367. *Pinus Lambertiana*, Doug.—Sugar Pine.—Sierra Nevada Mountains. Found sparsely growing on the Sierras of California, through their extent, at altitudes of from 4,000 to 10,000 feet. It is often 150 to 220 feet high, with a diameter of 8 to 14 feet. It is highly prized and eagerly sought by lumbermen for all articles of building-lumber, and is fast being exhausted. It is called Sugar Pine from the sweet resin which exudes from partially-burned trees. It is also called Mammoth Pine and Shake Pine. It has enormous cones.

No. 368. *Pinus monticola*, Dougl.—Soft Pine; Little Sugar Pine.—California. Grows sparsely on the high Sierras, at altitudes of 7,000 to 11,000 feet. It sometimes attains a height of 150 to 200 feet, with a diameter of 5 to 7 feet. It resembles the Sugar Pine, but with whitish, much furrowed, bark and smaller cones. The timber is similar to that of White Pine, but is seldom used, because the trees are so inaccessible.

No. 369. *Pinus strobus*, L.—White Pine; Weymouth Pine.—Eastern United States. An old, well-known, and useful tree, extending from Canada to Virginia, but plentiful in New England, New York, and Pennsylvania. It is a large tree, becoming 100 to 150 feet high. It is the source of much of the lumber brought from the Northern States. It is not only very valuable on account of its wood, but is one of the finest ornamental conifers.

No. 370. *Pinus Chihuahua*, Eng.—Southern Arizona and Northern Mexico.

No. 371. *Abies alba*, Michx.—White Spruce.—New England and Alleghany Mountains. A small tree, native of the northern portion of the United States and Canada, extending northward to the extreme confines of vegetation. It grows from 20 to 30 feet high, according to soil and latitude. It is frequent in cultivation, and is considered a handsome tree.

No. 372. *Abies nigra*, Poir.—Black Spruce.—New England and Alleghany Mountains. This tree has much the same range as the preceding, occasionally being found farther south on the Alleghanies. In favorable situations, it forms quite a large tree, about 75 feet high, tall and straight. The wood is light, elastic, and strong, and valuable for many purposes.

No. 373. *Abies Canadensis*, Michx.—Hemlock.—New England to Wisconsin. A well-known tree of the Northern States, extending northward to Hudson's Bay, and southward along the mountains to North Carolina. It is one of the most graceful of spruces, with a light and spreading spray, frequently branching almost to the ground. The wood is coarse-grained, but is used in great quantities for rough work. The bark is very extensively employed in tanning.

No. 374. *Abies Mertensiana*, Lind.—Western Hemlock.—California and Oregon. This tree closely resembles the *A. Canadensis.* It grows from 100 to 150 feet high, and forms a roundish, conical head. The timber is said to be soft and white, and difficult to split.

No. 375. *Abies Williamsoni*, New.—Williamson's Spruce.—California and Oregon. Grows on the Sierras of California and on the Cascade Mountains of Oregon, on high peaks of 8,000 to 12,000 feet altitude. A very graceful tree, attaining a height of 150 feet. The wood is of excellent quality, but is too rare and inaccessible to be much known.

No. 376. *Abies Douglasii*, Lind.—Douglas's Spruce.—Rocky Mountains. This species grows through the Rocky Mountain region from Colorado to Nootka Sound. On the Pacific coast, it sometimes attains the immense size of 200 to 300 feet in height, and a diameter of trunk of 8 to 15 feet. Its timber composes the great lumber wealth of Oregon and Washington Territory. The wood is soft and easily worked, much prized for masts, spars, and plank for ship-building, and is equally valuable for other building purposes. A tree cut by Mr. A. J. Dufur was 6 feet 4 inches in diameter 30 feet from the base, and 321 feet long.

No. 377. *Abies Douglasii*, var. *macrocarpa*, Torr.—Large-coned Spruce.—Southern California. This was collected many years ago on the mountains east of San Diego, Cal.; in 1874 sent to the Department of Agriculture by Mr. F. M. Ring, of San Bernardino, Cal.; and collected last summer by Dr. Palmer at San Felipe Cañon, east of San Diego. It has cones four or five times the size of *Douglasii*, and will probably be confirmed as a new species.

No. 378. *Abies Menziesii*, Dougl.—Menzies's Spruce.—Rocky Mountains. This species has a wide range in the Rocky Mountains from Colorado and Utah to Oregon and Sitka. It grows mostly at high altitudes, 7,000 to 9,000 feet. "In Utah," Mr. Ward says, "it is easily distinguished from the other firs by the dense masses of its long, pendant, dark-brown cones at the top of the tree, which frequently obscure the foliage. The wood is fine-grained and white, and would be valuable for timber but for the numerous slight curves in the trunk, which render it impossible to obtain saw-logs of any great length. In some places it is incorrectly called balsam, in others it is distinguished as spruce." Mr. Dufur, of Oregon, gives a somewhat different account of the tree as growing there. He says: "It grows along the tide-lands and about the mouth of the Columbia River, and is seldom found at an elevation of more than 500 feet. The young trees make a beautiful evergreen of pyramidal form. The large trees grow from 150 to 200 feet high, and from 2 to 6 feet in diameter. The wood is soft, white, and free, much prized for lumber."

No. 379. *Abies Engelmanni*, Parry.—Engelmann's Spruce.—Rocky

Mountains. This species is found on the higher parts of the Rocky Mountains, from New Mexico to the headwaters of the Columbia and Missouri Rivers. In Colorado, it occupies a belt between 8,000 and 12,000 feet, reaching its fullest development between 9,000 and 10,000 feet. On the highest summits, it becomes a prostrate shrub. Mr. Ward, writing of the tree in Utah, says: "Between 9,000 and 10,000 feet altitude, it becomes a large and noble tree, and is of the greatest value for lumber, taking the place in that region of the White Pine of the Eastern States, and is alone known by that name among lumbermen. The wood is white, very light, and easily worked, and at the same time durable." Botanically, it is difficult to distinguish it from some forms of *A. Menziesii.*

No. 380. *Abies balsamea*, Marshall.—Balsam.—New England to Wisconsin. This species grows in cold, damp woods and swamps, from New England to Pennsylvania, Wisconsin, and northward. It is also a native of Canada and Nova Scotia. It generally grows about 20 to 40 feet high. It is a very popular ornamental tree. "A very aromatic liquid resin is obtained from this tree by incisions made in the bark, and is called Canada Balsam."

No. 381. *Abies sub-alpina*, Eng.—Sub-alpine Balsam.—Rocky Mountains. This is one of the tallest and handsomest firs of the Rocky Mountains, often attaining a height of 80 or 90 feet; perfectly straight, and without limbs for a great distance. The wood is white, soft, and of little value for lumber. It is known among the lumbermen of the Wasatch Mountains as White Balsam, or Pumpkin-tree. Its nearest affinity is to *A. balsamea* of the Eastern States. It reaches to great altitudes, being sometimes found near the timber-line. It has often been collected, and generally referred to *A. grandis*, the incorrectness of which has been but lately pointed out by Dr. Engelmann, who has proposed for it the name given above.—(Ward.)

No. 382. *Abies grandis*, Lind.—White Silver Fir.—California and Oregon. This name is here applied to the tree of the Pacific coast. "In Oregon," Mr. Dufur says, "it grows on the low, moist land, along the small streams emptying into the Columbia River. Is seldom found at an elevation of more than 500 feet, and never on sandy or gravelly ridges. It attains a size of from 2 to 4 feet in diameter, and 200 feet in height. It has a light-colored, thin, smooth bark. It is a rapid grower, and the timber decays correspondingly fast when exposed to the wet. The wood is white, free, and soft, but too light and brittle for general building purposes. It is used extensively by the settlers for clapboards, boxes, and cooperage."

No. 383. *Abies concolor*, Eng.—White Silver Fir.—Rocky Mountains. In the Wasatch Mountains in Utah this tree is very valuable for lumber, and is called Black Balsam. It is there a large tree, sometimes 3 or 4 feet in diameter and 40 to 50 feet high. The wood is tough and coarse-grained, adapting it for building purposes and all substantial uses. It ranges from 8,000 to 9,000 feet in altitude.—(Ward.) In Southern Utah, it is sometimes called Black Gum.

No. 384. *Abies amabilis*, Dougl.—Red Silver Fir.—California and Oregon. Mr. Lemmon states, "On the Sierra Nevada Mountains, it forms dense, scattered groves, at altitudes of 7,000 to 10,000 feet. The largest trees are 250 feet high and 6 to 10 feet in diameter. A truly beautiful and magnificent tree, sometimes called the Queen of the Forest." Mr. Dufur says it is found extensively along the western slope of the Cascade Mountains, on sandy, gravelly, rocky, and dry elevations. Its usual size is from 150 to 200 feet in height, and from 1 to 4 feet in diameter. The wood is rather coarse, but elastic, strong, and hard. It

is used extensively for coarse building purposes, and also for masts and spars for ship-building. The wood has a peculiar red color, and spikes, nails, and bolts hold firm, and never corrode in the timber.

No. 385. *Abies Fraseri*, Pursh.—Fraser's Balsam.—Alleghany Mountains. This species inhabits the highest parts of the Alleghanies, in North Carolina. It is said to be a small tree, ranging from 20 to 50 feet in height. The cones resemble those of *A. nobilis* in miniature.

No. 386. *Abies nobilis*, Lind.—The Noble Fir.—Oregon. This is one of the magnificent conifers of our country. It is a majestic tree, forming vast forests on the mountains of Northern California and Oregon. The Indians give it the name of Big Tree. The timber is said to be of excellent quality. It is nearly related to *A. Fraseri*, but has cones five times as large.

No. 387. *Abies bracteata*, Hook.—Bracted-coned Spruce.—Oregon. This species grows on the higher mountains of Oregon. It was also found by Dr. Coulter in Southern California. It is little known. The cones are very curious and remarkable, being handsomely fringed by long leaf-like bracts, entirely different from those of any other species.

No. 388. *Larix Americana*, Michx.—American Larch.—New England to Wisconsin. This species is seldom found so far south as Virginia; its favorite localities being the New England States, Northern New York, westward to Wisconsin, and northward to Canada. In Canada, it is called Hackmatack; in some portions of New England and New Jersey, Tamarack. The quality of the wood is represented as being superior to any kind of pine or spruce.

No. 389. *Larix Lyallii*, Parl.—Lyall's Larch.—Oregon.

No. 390. *Larix occidentalis*, Nutt.—Western Larch.—Oregon. Mr. Dufur says this species is found abundantly in the Blue Mountains in Eastern Oregon, also well up in the Cascade and Coast Ranges, but seldom at an elevation of less than 3,000 feet. It is often found 250 feet high, and attains a diameter of 5 feet, frequently being found 200 feet to the first limb. The timber is very strong and durable, free to split, and used for all kinds of fencing and coarse building.

No. 391. *Torreya taxifolia*, Arn.—Yew-leaved Torreya.—Florida. A small tree from 20 to 40 feet high, found on the east bank of the Apalachicola River in Florida. It is called by the inhabitants Stinking Yew, from the unpleasant odor of the bruised leaves. The genus was named in honor of Dr. John Torrey, the late eminent botanist of New York. It is considered to be a very ornamental evergreen in cultivation.

No. 392. *Torreya Californica*, Torr.—California Nutmeg-tree.—California. This species grows near the coast in California. It sometimes attains the height of 60 feet, with a trunk 4 feet in diameter, but is usually a round-headed, small, compact tree, 20 to 40 feet high. The timber is said to be heavy and fine-grained. It is, like the preceding, called the Stinking Yew, from the unpleasant odor of the bruised leaves. The seeds have a rugose and mottled appearance, resembling a nutmeg, whence the name.

No. 393. *Taxus brevifolia*, Nutt.—Short-leaved Yew.—California and Oregon. A tree of California and Orgon, varying much in height in different localities. Dr. Newberry saw it forming an upright tree 50 to 75 feet in height and 2 to 3 feet in diameter. Mr. Dufur says it is found on the lowlands of Willamette Valley, is of slow growth, and seldom attains a height of 12 to 20 feet and a diameter of a foot. It is very scarce in all parts of Oregon. The small, red berries remain on the tree till late in the fall, and are used for food by the Indians. The wood is

very hard and durable, is capable of receiving a fine polish, and is much prized for its fine grain, durability, and beauty.

No. 394. *Taxus Floridana*, Nutt.—Florida Yew.—Florida. This species, so far as is known, is confined to a very limited field on the Apalachicola River in Florida. It is a small tree, from 10 to 20 feet high.

No. 395. *Thuja occidentalis*, L.—American Arbor Vitæ.—New England to Wisconsin. This tree is well known in cultivation, but in a native state is rarely found south of New York. In Canada and along the lakes, it is known as the White Cedar, which is the name given in New Jersey to the *Cupressus thyoides*. The Arbor Vitæ grows 25 to 50 feet high, forming a handsome, conical tree. The wood is light and soft, but durable, and is considerably used for building purposes. It is frequently employed as a hedge-plant and as an ornamental tree.

No. 396. *Thuja gigantea*, Nutt.—Giant Arbor Vitæ.—Oregon and Northwest coast. This tree is found in the greatest perfection on the western slope of the Cascade and Coast Ranges in Oregon and Washington Territory, at an altitude of from 500 to 1,000 feet. It attains not unfrequently the enormous size of from 10 to 15 feet diameter and 200 feet in height. The timber is very soft, smooth, and durable. It makes the finest sash, doors, moldings, &c., and all kinds of building-lumber. The young trees are beautiful ornamental evergreens, and make a handsome hedge.

No. 397. *Thuja plicata*, Don.—Nee's Arbor Vitæ.—Pacific coast.

No. 398. *Cupressus thyoides*, L.—White Cedar.—Middle and Southern States. This tree is found in swamps chiefly in the Atlantic States from Massachusetts to Florida. It has also been found near the Great Lakes. The tree rarely exceeds 70 or 80 feet in height, with a straight, tapering trunk. The wood is light, fine-grained, exceedingly durable, and easily worked. In New Jersey, it is largely made into shingles.

No. 399. *Cupressus macrocarpa*, Hart.—Monterey Cypress.—California. This is found in the vicinity of Monterey, Cal., where it grows 50 to 60 feet high, with a diameter sometimes of 3 to 4 feet. It is one of the finest cypresses known.

No. 400. *Cupressus Nutkanus*, Hook.—Nootka Cypress.—Oregon and the Northwest coast. This grows at Vancouver's Island and near Nootka Sound. It is a tall tree of 80 to 100 feet high. The timber is white, soft, and valuable.

No. 401. *Cupressus Lawsoniana*, Murray.—Lawson's Cypress.—Mountains of Northern California.

No. 402. *Cupressus MacNabiana*, Murray.—McNab's Cypress.—Mountains of California and Oregon.

No. 403. *Taxodium distichum*, Rich.—Bald Cypress.—Southern States. This tree is found in all the Southern States, extending into Delaware and into Southern Illinois. In rich, alluvial bottoms, it frequently grows to the height of 120 feet. The roots often form large conical excrescences, called "cypress knees," which rise above the surface of the soil to the height of 2 to 4 feet. The wood is fine-grained, soft, elastic, strong, and exceedingly durable. Large quantities are made into shingles, and marketed at the North. Its foliage is delicate and beautiful, but is dropped during the winter.

No. 404. *Sequoia sempervirens*, End.—Redwood.—California. This is the mammoth tree of the coast of California, second only to the next species. It rises to the height of 200 to 300 feet, and sometimes with a circumference of 60 feet. The wood is dark red, rather light and brittle, but exceedingly durable, and makes valuable lumber.

No. 405. *Sequoia gigantea*, Torr.—Giant Redwood.—California. This is the mammoth or big tree of California, growing in several groves on the

western slopes of the Sierra Nevada Mountains, at an altitude of 5,000 to 9,000 feet. The largest trees are over 300 feet high, and over 30 feet in diameter.

No. 406. *Libocedrus decurrens*, Torr.—Bastard Cedar.—California. This is sometimes called Red Cedar, or Post Cedar. It grows in the Sierras of California, at elevations of from 3,000 to 7,000 feet. It is a handsome tree, of low, conical form, tapering fast; 4 to 6 feet diameter at base; but only about 100 feet high. The wood is light and strong, and makes excellent cabinet-work, boxes, &c.

No. 407. *Juniperus Virginiana*, L.—Red Cedar.—Eastern United States. This is the Red Cedar of the eastern portion of the United States. It grows to the height of 30 or 40 feet, generally with a compact conical form. The timber is exceedingly valuable, being light, fine-grained, compact, and durable. The heart-wood is of a handsome dark-red color. It is used for a great variety of ornamental work, and for fence-posts is almost imperishable.

No. 408. *Juniperus Virginiana*, var. *Bermudiana.*—Pencil Cedar; Florida Cedar.—Coast of Florida. This variety, or species, as it is regarded by some, grows on the western coast of Florida. The wood is softer and freer from knots than the common form, and the pencil-manufacturers obtain their cedar wood from this source.

No. 409. *Juniperus Virginiana*, var. *montana.*—Rocky Mountain Red Cedar.—Rocky Mountains. A form or variety of Red Cedar found in Colorado and Utah. "In the Wasatch Mountains, Eastern Utah, this tree grows along the cañons containing water throughout the year, and not in dry places. Its form is there quite different from the Red Cedar in the East, being taller and with a looser and less symmetrical top. The people there say that the wood is not durable, and do not use it for fence-posts, &c., as is done with the eastern variety."

No. 410. *Juniperus occidentalis*, Hook.—Western Cedar.—Rocky Mountains, California, and Oregon. This is undoubtedly the cedar named by Dr. Hooker *J. occidentalis.* It grows on the east side of the Cascade Mountains in Oregon and also in California. It is of slow growth, seldom attaining more than a foot in diameter and 30 feet in height. The wood is nearly all white, and harder than the Red Cedar.

No. 411. *Juniperus occidentalis*, var. *Texana.*—Rock Cedar.—Texas and westward. This forms extensive woods on rocky soil in Western Texas. The trunk is sometimes over one foot in diameter, yearly rings eccentric. It branches low, and forms almost impenetrable thickets. It is common fuel and fencing timber in Western Texas.—(Lindheimer.)

No. 412. *Juniperus Californicus*, Carr.—Sweet-fruited Juniper.—Southern California. A cedar growing from San Felipe Cañon, in the Cuyamaca Mountains, Southern California, into Arizona and Mexico. It is a dwarf tree, and is very prolific of berries, which are as large as large peas, of a somewhat resinous but sweet taste. The Indians consume large quantities of them for food. The seeds are large, smooth, and free, one or two in each berry.

No. 413. *Juniperus Californicus*, var. *Utahense.*—Western Red Cedar.—Utah and California. This is the prevailing Cedar of the Wasatch Mountains, and ranging into Nevada and Southern California. In Eastern and Central Utah, this tree covers the slopes and foot-hills at from 5,000 to 7,000 feet altitude. It is low and spreading at the base, with a dense pyramidal top, light-green foliage, and large rather woody berries, not so nutritious as those of the preceding kind. The wood is extremely durable, and used for fence-posts. In Southern Utah, the berries are eaten by the Indians. The bark was formerly used by them in manufacturing many articles of clothing.

PALMACEÆ.

No. 414. *Sabal Palmetto*, R. & S.—Cabbage Palmetto.—Coast of North Carolina and southward. The well-known Palmetto-tree of the Southern States, from North Carolina to Florida. It grows in sandy soil along the coast, with a stem from 20 to 40 feet high. The leaves are 5 to 8 feet long. "In the Southern States, the wood of this tree, though extremely porous, is preferred to any other for wharves," and when constantly under water is almost imperishable, but, when exposed to be alternately wet and dry in the flowing and ebbing of the tide, it decays as rapidly as other wood.

No. 415. *Brahea edulis*, Wad.—Guadalupe Palm.—Guadalupe Island. Guadalupe Island is off the coast of Lower California, 200 miles from San Diego. It is about twenty-six miles long by ten wide. It is owned by a chartered American company for the raising of Angora goats. On the island there is a palm-forest, of this species, of several thousand acres in extent. They grow from 12 to 20 feet high, and have a diameter of trunk of 8 to 15 inches. The fruit is about the size of a plum, hanging in clusters, like grapes, 2 feet long, weighing from 30 to 40 pounds, growing from one to four bunches to a tree. The fruit is eagerly eaten by goats.

No. 416. *Pritchardia filamentosa*, Wend.—California Palm.—Southern California. This palm has been in cultivation to some extent for several years, both in Europe and in this country, under the name of *Brahea filamentosa*. It has recently been decided to belong to a different genus, (*Pritchardia*.) It grows on rocky cañons near San Felipe, some seventy-five miles northeast of San Diego, California. It grows to the height of 50 feet. The fruit is small, (as large as peas,) black, and pulpy. Though containing little nourishment, they are used as food by the Indians.

No. 417. *Thrinax parviflora*, Sw.—Silver Palmetto.—South Florida. This palm was found last fall by Dr. Chapman in South Florida. The stem is rarely 6 inches in diameter, yet they attain a height of 30 to 40 feet. "It occurs first at Cape Romans and is found sparingly on the mainland southward. It is more common on the keys, but I never heard of it before."—(Chapman.) The wood is quite dense; the berries white.

LILIACEÆ.

No. 418. *Yucca brevifolia*, Eng.—Desert Yucca.—Arizona and Southern Utah. This singular tree grows in the deserts of Arizona and Southern Utah. It is from 10 to 20 feet high, with a trunk sometimes 10 or 12 inches in diameter. It is fibrous in all parts, so that the whole plant may be converted to paper.

No. 419. *Yucca Treculiana*, Carr.—Spanish Bayonet.—Western Texas and westward. Sometimes with a stem over 1 foot diameter and 50 feet high, branching only near the summit, every branch bears a thyrsus of flowers 3 to 4 feet high, each consisting of several hundred white fleshy flowers, shining like porcelain. The fruit is edible, resembling the papaw. The leaves are 2 to 4 feet long, deeply channeled, and pointed by a sharp thorn.—(Dr. Lindheimer.)

MICROSCOPIC OBSERVATIONS.

BY THOMAS TAYLOR, MICROSCOPIST.

CELLULOSE AND STARCH.

It has been decided by high authority that *Bacterium** consists principally of vegetable cellulose,† because, when subjected to a boiling solution of the alkalies, it remains undissolved. When rod-bacterium (*Bacterium termo*) is treated with a tincture of iodine, its interior structure is changed from its natural transparent whiteness to an amber-color, which indicates the presence of protoplasm within its outer elongated cell. It is popularly supposed that any object composed principally of vegetable fiber must necessarily be devoid of animal life, and that, although many microscopic germs exhibit animal motions in water, they may, notwithstanding, be purely vegetable; but it has been demonstrated that parts of certain animals, as the mantle of the *Tunicata*, consist of cellulose. It may therefore be reasonable to expect, as a necessary consequence, the presence of analogous substances in them, such as animal starch, glycogen,‡ and chitine, § which are convertible into one another.

* One of the earliest organisms appearing in decaying and putrefying animal and vegetable solutions.

† Cellul ose is the characteristic tissue of the vegetable kingdom. It forms the fundamental layer of all vegetable cell-walls. The young parts of plants consist chiefly of cellulose; it exists in a tolerably pure state in the pith of the elder-tree.—(Johnston.) More recently, according to De Luca, it is found in the skin of the silk-worm and of serpents. Béchamp says that it is found in the vibrating corpuscles of the silk-worm. Löwig and Kölliker have recognized cellulose in the cartilaginous capsule of the simple *Ascidiæ*, in the leathery mantles of the *Cynthiæ* and the outer tube of the *Salpæ*.

Chemical properties of cellulose.—When cellulose is treated with oil of vitriol, concentrated hydrochloric acid, or a concentrated aqueous solution of chloride of zinc, it yields products which are converted into glucose when their aqueous solution is boiled with water. Glucose is likewise produced in the decomposition of lignosulphate of lead, and by the action of alkalies on pyroxyline. But it is doubtful also whether this sugar should be regarded as dextro-glucose. According to Béchamp, (N. Ann. Chim. Phys., 48, 502,) it yields, when treated with alcohol, two sorts of crystals, one sort having the hardness of cane-sugar, the other resembling dextro-glucose.

The skin of the silk-worm and the matter which remains in the cocoons, when the butterflies escape, are capable of yielding a substance isomeric with cellulose, which may be converted into glucose. When the caterpillars are boiled for several hours with strong hydrochloric acid, and this treatment is repeated three times with the residue, and the residue is washed with strong potash-lye, then with water, and dried between 100° and 110°, a white, light substance, nearly free from nitrogen, is obtained, which gradually diffuses in oil of vitriol, forming a colorless gummy liquid. This solution added in small quantities to boiling water, and boiled for an hour or two, yields fermentable sugar, which reacts like glucose with common salt and potassio-cupric tartrate.—(De Luca, Comptes rendus, 53, 102.)

‡ Glycogen, a term generally applied to animal starch, so-called, discovered by Virchow, who found it in degenerated liver and spleen; also in diseased kidneys, brain-granulations, and concretions of the prostate gland. He says such tissues assume a reddish-brown or more rarely a dirty-brown violet color when treated with tincture of iodine. When treated with oil of vitriol and iodine in succession, they acquire a green color, changing to a dirty violet or sometimes blue.—(Gmelin's Chemistry, vol. xviii, p. 334.)

§ Chitine resembles cellulose. It is supposed by some to be nitrogenous; it forms the elytra and integuments of insects and the carapaces of *Crustacea*. It may be obtained by exhausting the wing-cases of cockchafers successively with water, alcohol, ether, acetic acid, and boiling alkalies. The final residue retains completely the form of the wing-cases. Frémy prepares chitine by treating the tegumentary skeleton of a crustaceous animal with cold dilute hydrochloric acid, to remove calcareous salts; washing with distilled water; boiling for several hours in a solution of potash, which

Such is found to be the case, in some respects, in the vegetable kingdom; and since vegetable structure has been found in the mollusk alluded to, it may be presumed to be present in the higher forms of life, as in the vertebrates, including man; and as nature does nothing in vain, the presence of cellulose in animals would imply that it has some function to perform for which it is peculiarly fitted in their vital economy.

That the consideration of animal and vegetable pathology comes strictly within the scope of agricultural investigation is demonstrated by the ravages of the rinderpest, horse-influenza, and numerous vegetable-blights, the cause or causes of which have so frequently eluded the skill of the most scientific specialists of America and Europe. As long, therefore, as scientific men remain unacquainted with any of the constituents of animals and vegetables, so long will they be unable to treat animal or vegetable maladies upon strictly scientific principles. Not

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removes adhering albuminous substances, and has no action upon chitine; again washing with distilled water, and purifying the residue with alcohol and ether.

When chitine from the carapace of the crab is boiled for several hours with dilute sulphuric acid, only the softer membranes are attacked, while the more solid integuments become loose and soft, and form, after pressing and washing with water, a mass having almost the consistence of starch. The acid liquid supersaturated with lime, and then neutralized with sulphuric acid, yields neither tyrosine nor leucine, but contains ammonia with amorphous sugar, as it precipitates cuprous oxide abundantly from an alkaline solution of cupric oxide.—(Städeler.) Berthollet (Ann. Ch. Phys. [3] lvi, 149) likewise obtained sugar from chitine, prepared from the integuments of lobsters, crabs, and cantharides, by macerating it in strong sulphuric acid till it was dissolved, dropping the solution into one hundred times its volume of boiling water, boiling for an hour, saturating with chalk, &c.

The above-mentioned pasty residue is colored brown-red by iodine, like unaltered chitine, and, by prolonged boiling with sulphuric acid, yields an additional quantity of sugar, while the undissolved portion always contains nitrogen. The same substance, after removal of the acid, forms with water a turbid emulsion, which takes a long time to clarify, and dries up by spontaneous evaporation to a soft, skin-like membrane, which exhibits, with iodine-water, the same reactions as the original chitine. (Städeler.)

The composition of chitine is determined by the following analyses:

	Schmidt. Mean of 11 analyses.	Lemann.	Schlossberger.	Städeler.	Calculation $C^9H^{15}NO^9$.
Carbon	46.64	46.73	46.64	46.32	46.35
Hydrogen	6.60	6.59	6.60	6.65	6.44
Nitrogen	6.56	6.49	6.56	6.14	6.01
Oxygen	40.20	40.19	40.20	40.89	41.20

Frémy found in chitine 43.35 carbon, 6.65 hydrogen, and no nitrogen; whence he regards chitine as isomeric with cellulose, (44.4 C, 6.2 H, and 49.4 O.) Gerhardt regarded Frémy's results as more nearly correct than those of the German chemists, because chitine yields by dry distillation nearly acetic acid and empyreumatic oil, without any ammonia, and the products of its putrefaction under water are different from those of most nitrogenous substances. But the analyses above given exhibit a closeness of agreement which could scarcely be expected if the substances operated upon had been impure.

Städeler regards chitine as a glucoside, $C^9H^{15}NO^6$, which is resolved by boiling with acids into glucose and lactamide, (or alanine or sarcosine:)

$$C^9H^{15}NO^6 + 2H^2O = C^6H^{12}O^6 + C^3H^7NO^2.$$

If this decomposition really takes place, lactic acid should likewise be obtained as a product of the transformation of the lactamide or alanine; but the presence of lactic acid among the products has not yet been demonstrated. Städeler also suggests that chitine, at least in *Crustacea*, may be formed by the union of lactate of ammonium with gum, and elimination of water:

$$[\underset{\text{Acid lactate of ammonium.}}{C^3H^4O^3,H,NH^4} + \underset{\text{Gum.}}{C^6H^{10}O^5} = \underset{\text{Chitine.}}{C^9H^{15}NO^6} + 2H^2O,]$$

Since he has found gum in the juices of crabs and other *Crustacea*, the presence of actic acid in the gastric juice of the lower animals is by no means improbable.

only should we endeavor to discover all the constituents of their organs, and their relations to each other, but should also take into account those of the ever-active elements which surround them, as the temperature and humidity of the atmosphere, the effect of light and shade, climate, altitude, and geographical condition, as these are of the utmost importance in the investigation of every form of organic disease. If it can be shown that cellulose exists in all the important organs of the higher animals, the necessity of a more careful examination of its uses will become apparent; and such examinations may result in the discovery of new relations between animal and vegetable structure, while it may also necessitate a revision of received opinions as to the boundary-line between animal and vegetable life.

In consideration of the foregoing views, I have made a series of investigations with animal substances, commencing with the eggs of insects, the eggs of fowls, milk, cerumen, (ear-wax,) the flesh and blood of various animals, including man, and have found in them in every instance cellulose and animal starch, and in some cases capillary vessels, of a translucent red color, containing liquid starch, colored blue from the iodine used during my experiments. The following statement embraces the results of some of these experiments.

If about a cubic inch of liver, spleen, heart, brain, or muscle of the higher animals be immersed in two fluid-ounces of caustic potash about twenty-four hours, at a temperature of about 80° Fahrenheit, it will dissolve completely. On the addition of acetic acid in excess, the potash will be neutralized, and a flocculent precipitate will fall, which, by ordinary filtration, may be separated from the liquid. Remove the filtrant by means of a sable-hair pencil, taking care not to remove any of the fiber of the paper with the animal matter. Place a small portion of the filtrant on a capsule, and add to it a drop of concentrated sulphuric acid, followed by one of the tincture of iodine. Then place a portion of the composition on a microscopic slide, covering it with a disk in the usual manner, and examine it with a power of about 100 diameters. Under these conditions, blue granules and structural cellulose will sometimes be seen, combined with amber-colored albuminous matter. Frequently cellulose, although present, is not seen; but by subjecting the composition to friction, and adding a little more sulphuric acid and iodine, well-defined blue-colored structural forms become apparent.

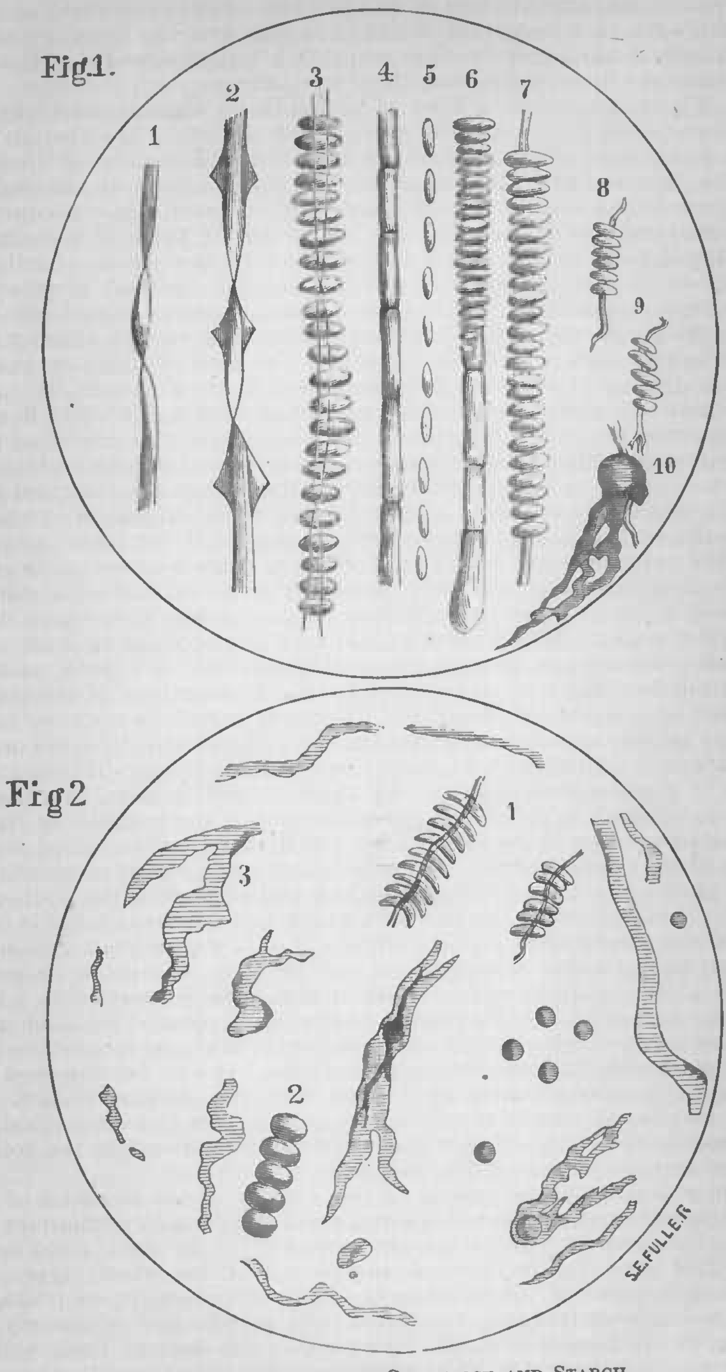
The structure and chemical behavior of animal-starch granules, which are sometimes observed, differ in some respects from those of potato-starch; the latter are at once dissolved by caustic potash and concentrated nitric and sulphuric acids, but animal starch is not so easily dissolved. As a general rule, the latter resists for a considerable time the solvent action of these powerful chemicals. In form, animal starch frequently resembles potato-starch. The granules of the former are found, however, to be sometimes as large as the .004th of an inch in their shorter diameter by about .007th of an inch in their longer, while many of them are as small as the thousandth of an inch in their longest diameter, or even less. Animal-starch granules, when compressed, will frequently burst, and the liquid contents coagulate at once in the presence of sulphuric acid. I have found, during my investigations, hollow starch-granules intensely blue, from which their liquid starch had been expelled by pressure. Blue-colored starch and cellulose structures sometimes appear of a green color in consequence of being covered with amber-colored albuminous matter. On the application of water and friction, the latter may be removed, when a deep-blue structure will become apparent.

CELLULOSE AND STARCH IN PLANTS AND ANIMALS.—As cellulose and starch have very important relations to man and the lower animals as food-constituents, and in other respects, I have deemed it advisable to continue my investigations on these substances.

1. Fig. 1 represents a fiber of cotton in its natural condition; 2, a fiber subjected to the action of strong sulphuric acid; 3, a fiber on which was first placed a drop of a strong amber-colored solution of tincture of iodine, followed by a drop of commercial muriatic acid, and immediately afterward by a drop of concentrated sulphuric acid. In consequence of the combinations of the sulphuric acid with the water of the muriatic, the liquid boils two or three seconds, and by this chemical action the cellulose or cotton fibers are quickly changed in their structure and chemical composition. When viewed under a power of about 100 diameters, the fibers will be found to have been reduced to a starchy condition, and in many cases will appear in the form of disks or beads of a well-defined blue color; 4 represents a fiber of flax in its natural condition; 5, when treated with concentrated sulphuric acid; 6 and 7, when acted on by the tincture of iodine and acids, as described in the case of cotton fibers. Membraneous cellulose and also amorphous may be stained blue in the same manner, but they retain their original forms. To illustrate this, saturate a few grains of bleached flax in commercial muriatic acid, then add, by degrees, concentrated sulphuric acid, and stir the mixture with a glass rod until the mass becomes pulpy or partially dissolved; then add to it an excess of water, and let it stand for several hours to allow the cellulose to precipitate, after which decant the clear water. This process of adding water or washing must be repeated several times, or until the solution has no acid taste, when the pulp will be ready for future experiment. If a portion of the pulp be viewed by a power of about 100 diameters, it will be seen to consist mostly of amylaceous precipitated matter, (amorphous,) void of organic structure, combined with partially-dissolved flax fibers. If it be ground with a glass spatula, and viewed again, it will be seen that the only change effected is the reduction of the size of the particles of flax, no starch-like bodies being observable; but if there now be added to it one drop of the tincture of iodine, one of muriatic and one of sulphuric acid, blue globular and starch-like bodies will be formed from the undissolved flax. That portion of the flax fiber which was rendered soluble in the acids, and precipitated on the addition of pure water, is amorphous cellulose, and remains structureless. If the pulp so treated be ground again with a spatula while combined with these solvent acids, a much greater variety of these globular bodies will appear. Rotation and a solvent solution are all that is necessary in this case to produce these artificial starch-like granules in abundance. It will be observed that these amylaceous granules are formed from two distinct causes. The first mentioned results from the expansion of the disks described, and the second from the action of the soluble acids, assisted by the rotation of the partially-dissolved flax particles.

The spiral cellulose vessels of the ovaries of the blossoms of fruit and tender leaves of the beech are stained purple and sometimes pale blue; but those of fruit-tubers and matured foliage are stained brown. The first is of the amylaceous, the second of the woody type. The larger proportion of the cellulose structure of the nutritious fruits, foliage, and grasses is easily converted into starch, and ultimately into sugar, by chemical means, and by animals when used as food, and are known as carbohydrates. The mycelium of microscopic fungi consists, for the most part, of cellulose; and, although the fungi are very low

PLATE XIV.



Animal and Vegetable Cellulose and Starch.

forms of plant-life, they are not only the principal formers of some of the organic acids, as the acetic, but they grow to maturity in them; while the woody cellulose of the higher plants dissolves in the acetic ferments and becomes food for the cryptogams. Some varieties of mycelium take the blue stain by iodine and sulphuric acid, while other kinds are turned of an amber-color by the same tests.

When gun-cotton, a nitro-cellulose body, is treated very frequently with the iodine and acid tests, as described in the experiments with cotton and flax, it becomes yellow or amber-colored; and when the fine sawdust of box-wood is similarly treated, it appears, when viewed under the microscope, of three colors, amber, green, and blue; but the latter color appears in very small quantities. Chitine, the cellulose of insects, is stained yellow, and is supposed by some chemists to be combined with nitrogen. Color cannot be relied on wholly as a test for cellulose, since it assumes so many colors under treatment with iodine and acid. The following colors are frequently observed when treating cellulose and starch with iodine and sulphuric acid: Purple, bluish-purple, green, yellow, amber, reddish-amber, pale-blue, deep-blue, and a translucent amylaceous white. When starch is acted on by sulphuric acid alone, it dissolves, and is partially carbonized.

In making investigations on animal tissues, viscera, and blood, I have endeavored to ascertain the condition of the cellulose in them, whether it is tubular, membraneous, or amorphous. If a portion of brain is bruised, and combined with iodine and the acids mentioned, so as to produce the boiling heat, amber, purple, and blue colored forms are frequently seen, particularly so when the brain of a herring is used in the experiment. Crystalline plates are frequently seen in the brain of a calf, and are without color until subjected to the action of iodine and sulphuric acid, when they become blue. These plates are known to be cholesterine. In my experiments on the heart, liver, muscles, &c., of the higher animals, I never fail to detect structural cellulose in them. 8, 9, and 10 represent some of the forms found under chemical action; 1, Fig. 2, is similar; 2 and 3 and the other forms of this plate are produced from 1 by using extra acid, and sometimes by slight friction. In animal tissues and viscera, a great variety of cellulose and tubular forms may be detected in various stages of color, which are not represented by the cuts. To be successful in these experiments, a great deal of perseverance is necessary, as the animal cellulose is well protected by the other substances present, which frequently resist the tests applied until they are repeated several times. Fresh animal tissues, viscera, &c., should be used in making preliminary examinations.

Since writing the foregoing, I have made some new experiments on human arterial blood taken directly from an artery, and also on the mixed blood of a fowl. In each case, well-defined amylaceous matter has been detected.

The fresh blood of a fowl was whisked with a fork to separate the fibrine from the liquid portion. The fibrine was next dissolved in dilute caustic potash, to which was added acetic acid until the precipitate ceased to form; a portion of it will ultimately float on the top; remove a portion of it by means of a clean glass rod, and place it on a microscopic slide; add to it one drop of transparent solution of tincture of iodine, followed immediately by one drop of concentrated muriatic or nitric acid; then examine it carefully under a power of about 150 diameters for starch; if it is present, it will appear in granules of a blue or purple color. At this stage of the process, these chemicals will not convert amylaceous cellulose into starch, even if present. To the same mixture,

provided muriatic acid and iodine only have been used, add one drop of concentrated sulphuric acid; place a glass disk over the contents, and blue amylaceous matter in various forms will probably be found; but should there be an entire absence of blue color, and opaque brown particles appear, remove the disk and apply the chemicals again as before. Should too much sulphuric acid be employed, the whole coloring mass will be dissolved. The amylaceous matter present at the same time appears, when superfluous sulphuric acid is used, in white translucent bodies, dissolving in streaks; but the proper admixture of iodine solution with muriatic and sulphuric acid will give the desired results. Many experiments will need to be made by microscopists before sufficient expertness and satisfactory results can be obtained. That portion of the blood which remains after the fibrine has been removed from it has been examined for starch granules, but none were found; when tested for amylaceous cellulose, a trace of it appeared. I conclude, as a result of hundreds of experiments, that amylaceous cellulose is combined with the fibrine of the blood, arterial and venous, and may be detected in even a minute portion of it, in the manner described.

Nitric acid and tincture of iodine will detect starch in very minute particles when muriatic acid and iodine would fail. But nitric acid cannot be employed to advantage with sulphuric acid and iodine tincture when the object is to detect cellulose only.

HYDRATED CELLULOSE.—It has long been remarked that, under the influence of acids, cellulose becomes extremely friable. Paper bleached with a too large excess of chloride of lime, and linen submitted to the action of sulphurous acid, which transforms itself into sulphuric acid, may, by the least pressure, be reduced to powder. M. Girard, after a series of elaborate experiments, concludes that this transformation is due to the fixation of an equivalent of water by the cellulose, and he has produced the hydrate synthetically. It is a white substance, very easily pulverized. M. Girard considers that this hydration of cellulose plays an important part in the economy of nature, and that the production of rotten wood, of ulmine, and ulmic acid is always preceded by that of the newly-discovered hydrate.

Schäffer, (Ann. Ch. Pharm., clx., 312,) from his analyses of the mantles of the *Pyrosomidæ*, *Salpidæ*, and *Phallusia mamillaris*, finds that the cellulose, or tunicine, derived from them is identical with vegetable cellulose. The mantles, after being boiled in a Papin's digester to remove chondrin, were treated with dilute hydrochloric acid to remove the inorganic constituents. These consisted of calcium sulphate, sodium sulphate, and traces of iron, calcium carbonate, and calcium phosphate. The mantles were then boiled for several days in a saturated solution of caustic potash, and subsequently washed with alcohol and water. The mantles so treated retained their original form, but had become transparent like glass, but not horny, as Berthollet found in *Cynthia papillata*. The substance thus obtained is quite free from nitrogen, and contains 44.09 per cent. carbon, 6.30 hydrogen, and 49.61 oxygen.

With iodine and sulphuric acid it gives a violet color like vegetable cellulose. It is soluble in ammonio-cupric oxide, from which it is precipitated like cellulose by acids. The precipitate is soluble in dilute hydrochloric acid, and gives the cellulose reaction with iodine and zinc chloride. It is converted into sugar by prolonged heating with dilute sulphuric acid in closed tubes. Like vegetable cellulose, it is converted into pyroxyline by the action of fuming nitric acid. The mantles so converted into pyroxyline retain their form, but are very brittle. They are soluble in

ether, which, on evaporation, leaves a film like the ordinary collodion film. These reactions leave little doubt of the complete identity of animal and vegetable cellulose.

CRANBERRY ROT AND SCALD.

It has been suggested by several correspondents of this Department that an application of lime to the decaying vegetable matter composing cranberry bog-lands would increase fermentation rather than prevent the evil, and that the application of some other substance would probably prove more suitable for the purposes required. The action of lime on cranberry land differs materially from its action on farming land in general. Cranberry lands vary exceedingly in their conditions. I have found, for example, in New Jersey undecomposed peat-bogs six feet thick, charged with sulphureted hydrogen and organic acids. On such soil, cranberry-vines grow vigorously, and become heavily matted. The bloom is plentiful and the fruit grows in profusion, but under continual high temperature and drought fermentation is induced in the berries, and the cranberry "rot" succeeds. On the other hand, I have found a cranberry plantation having a soil of well-decomposed peaty matter six feet thick, and free from all disagreeable odor. Other conditions were also favorable to high culture, such as a plentiful supply of cool water, and cool breezes during hot weather.

Other plantations presented conditions entirely different from these. At Pemberton the cranberry-vines are planted mostly in black sand, a soil composed of pure white sand and a small portion of peaty matter, amounting to only 2½ per cent. of the latter. This soil, when sufficiently moist and subjected to a proper temperature, is quite favorable to cranberry growth, and proves very profitable; but during long droughts and high temperature the berries, even on this soil, also rot. In the absence of moisture, the roots fail to sustain the organic functions of the berry, and it becomes subject to the same kind of decay and rot that are observed when a healthy berry is removed from a healty vine and subjected to high heat of the sun. This fact is well understood by cranberry-growers. The soil which accumulates in old mill-ponds differs from the foregoing. It is composed mostly of decomposed leaves, moss, and similar substances, being a well-decomposed vegetable sediment, most of which had probably fermented in the forest before it was washed by rains into the ponds. By draining the water from these ponds gradually, the sediment consolidates into the condition of humus matter. Sometimes large trees in a state of fermentation are found in the bottom of mill-ponds, and bad soil and rotting berries have always been found in their immediate neighborhood. Pure sand, in some cases, has been used successfully in cranberry-culture when irrigated with cool and running peaty water; and so also clayey sand, but with indifferent success. In one case I found a condition of soil differing from all these. It consisted of "black sand," or "savanna," as it is sometimes called, and had on its surface about three inches of a heavy, undecomposed, fermenting peat, which had been spread over it by artificial means. Lastly, cranberry-land sometimes consists of a thin layer of well-decomposed peat, six to eight inches in depth, but rendered useless by being charged with back-water from adjacent fermenting bog-land.

In the use of lime, under such conditions, science and common sense must be exercised. In the first place, a bog consisting of six feet of fermenting muck, with a poor supply of pure running water, cannot be easily brought into the condition of pure humus matter by the use of

forty bushels of lime to the acre. This amount will prove beneficial, and if the following season should have favorable climatic conditions, and additional applications should be made, more satisfactory results may be expected from its use than would occur without it; but if a long drought and high temperature should follow, the value of the lime would not be appreciable; and yet the same amount applied to a thin layer of fermenting peat, with a proper supply of water, would give marked and valuable results. The application of lime to well-decomposed peaty matter or humus will not cause fermentation, but simply oxidation, producing a class of organic acids highly beneficial to plant-growth, being always combined with more or less ammonia. The application of caustic lime or carbonate of lime, especially the former, to savanna land, may generally be considered as injurious to it in the absence of a liberal supply of water charged with soluble humus matter; because the lime, whether caustic or otherwise, will soon destroy by oxidation the small percentage of vegetable matter contained in it. The savanna lands of the Cranberry Park Company, at Atsion, N. J., have a bountiful supply of peaty water at command, and the sour portions may be safely treated with lime in any form, while the savanna-lands, near Pemberton, in the same State, require very different treatment. All the land in that neighborhood which I examined was in a healthy condition, and free from sour acid odors; but some mode of irrigation will be required to keep the soil moist during long droughts. The application of sulphate of lime, (land-plaster,) which absorbs water from the atmosphere, would be more favorable for such land.

It is acknowledged that the savanna lands have a great tendency to be impoverished quickly under cultivation. I would recommend the adoption of the following mode of ameliorating such land: Take any quantity of heavy peat-muck, and make a compost of it with quicklime, turning it over frequently, and allowing the full action of the atmosphere on it. Frost will tend to pulverize it, while high temperature will favor fermentation, destroying its albuminoids. The lime will neutralize its tannic acid, and allow the proteine compounds preserved by it to pass through the stages of decomposition, converting the vegetable mass into humus matter. Any excess of lime will combine with the acetic and other organic acids present, neutralizing them. The whole mass, when dry, should be pounded or reduced by a rolling-machine to the form of powder, and spread over the surface of the savanna lands. Such a course should have been taken to improve one of the extensive plantations near Tom's River, alluded to in my previous report.

There is much evidence to show that the roots of the cranberry-vine succeed best when planted in loose, porous soil. While traveling over the highly-cultivated plantation of Joseph C. Hinchman, esq., he pointed out a number of barren spots and strips of land, which in former years had proved as well adapted to the growth of the vine as any other part of his land. Mr. Hinchman stated that persons who were employed in picking the berries would frequently draw heavy boxes over the vines, and in this way compact the sand or soil around the roots. In other cases, they would form in groups, and sit on the cranberry-vines when taking their meals. In all such places the vines ceased to grow thriftily. Mr. Daniel R. Gowdy also remarked that he could not account for the comparative barrenness of the land on the edges of his artificial water-courses. He said that formerly the vines grew in profusion on them, yielding fine crops of berries. On comparing the edges of the water-courses, artificial and natural, of Mr. Hinchman with those of Mr. Gowdy, a marked contrast appeared. On Mr. Hinchman's plantation,

the profusion of vines and fruit growing on the margins of the stream was quite remarkable. On the banks of his principal stream, the runners often extended from one to two yards in length, and were frequently seen floating on the surface of the stream, and bearing an abundance of ruby-colored fruit. When we take into consideration the fact that hundreds of persons pass over all the cranberry lands during the picking-season, it need not be surprising should a diminution of the cranberry-crop occur from this cause. While making an examination of the cranberry-plantation of Joseph J. White, near Pemberton, N. J., I failed to detect the odor of sulphureted hydrogen in the cultivated soil, but under the trodden paths I found it in abundance. In this fact we have at once a proof of the value of a porous soil, which will not only allow its deleterious gases to escape into the atmosphere, but will also permit the atmospheric air to penetrate freely to the roots of the growing vines.

In company with a committee, I visited the cranberry-plantations of John Webb, of Jackson Township, Ocean County, who was doubtless the first cultivator of cranberries in New Jersey. Mr. Webb commenced his experiments about the year 1843, although having no practical knowledge on the subject, but relying wholly on such information as he gained from newspapers coming occasionally into his hands. Living as he did in an isolated place, a few miles from Cassville, with no capital, he was embarrassed with many difficulties; still he persevered with his rude experiments, studying, as it were, instinctively the habits of the cranberry-plant, until success crowned his labors. On our arrival we found that he had just completed the plowing of his cranberry-bog. His plan consisted in throwing up light furrows of vines, one on the other, without allowing them to cover one another. I believe that Mr. Webb's plan would prove very successful if applied to some of the plantations I have described, as in the case of barrenness, and when polluted with fermenting matter and sulphureted hydrogen. Bog-lands covered with clayey sand would be much improved by commingling it with the peat soil, and in this way removing the clayey sand from the immediate roots of the vines. In such cases, of course, the vines should be resanded with coarse, sharp, clean sand.

Several members of the New Jersey Cranberry Association have expressed, by letters to this Department, a desire to know whether the color of the water on cranberry-plantations can be safely relied on as a test of the quality of peat-bottoms. Mr. James Fenwick, of New Lisbon, one of the most noted cranberry-growers of the State, writes to the Commissioner of Agriculture as follows:

I fear it may be thought by some that the statement which I made at the Cranberry Growers' Association that the water in my bog was highly colored, and yet for twenty years I had never had any rot, was designed to disparage the opinion of the Microscopist of the Department of Agriculture in regard to that disease; but it was not so intended. The association appeared to have the impression that colored water is the cause of the rot; an old idea started by some one who had white water on his plantation, to the injury of those who had colored water. I wish to say that the labors of the Microscopist in this investigation have been fully appreciated by me, and that personally I am thankful to the Department for them; but believing that the cause of the rot in cranberries in our pine region is generally owing to drought and high temperature, or flooding with heated or dead water, I am not disposed to change my views in this respect, and am still of opinion that his idea as to the cause of the rot in Dr. Merriman's bog is correct, and that we are indebted to him for it. His recommendation to keep the water near the surface in irrigation is reasonable, because in drought poisonous substances, consisting of sulphureted hydrogen and organic acids, rise from below, and injure the plants. He has advised the use of lime.

Professor Mapes and many others have recommended lime slacked with salt, which substances produce, in the presence of decaying organic matters furnishing carbonic acid,

chloride of calcium and carbonate of soda in a cheap form. Would not these substances be better than lime alone? And, in case of irrigation, would not a slow passage of water through the soil be preferable to flooding? Thus, suppose two ditches be made two rods apart; let the water be kept in them at a proper height to keep the ground moist, say one foot from the surface; put another parallel ditch between them for a feeder, and keep the water up to the surface of the soil; then there will be a motion of water through the soil toward the ditches on either side. In my judgment, this would be a great improvement on the present practice. It would supply moisture to the soil and have a tendency to carry off poisonous gases.

If Mr. Fenwick will review my papers published in the Department Monthly Reports for October, 1874, and January and October, 1875, he will find that my views, in the cases cited, agree with his as regards the causes which operate to produce cranberry-rot. I also consider that his views relating to drainage and liming are worthy of experiment, and I hope that he will assist in giving an early trial of them, and report the results to this Department.

The color of water on bog-land cannot be relied on as a test of the quality of peat-muck, inasmuch as color may be derived from a variety of causes. Bicarbonate of iron is soluble in water, producing a brown color. The coloring-matter of peat is also very soluble in solutions of soda, potash, and ammonia, forming deep, brown-colored solutions, and the salts of these alkalies have also a slightly soluble effect; while with caustic lime the coloring-matter is precipitated, giving colorless solutions, but the presence of sulphureted hydrogen in the soil will generally indicate when fermentation is in progress.

ULMIC COMPOUNDS, OR PEATY MATTER.—The composition of peat or mold varies with the nature of the plants which produce it. Plants containing tannin give an acid mold, while those which have no tannin form a mild mold more favorable to cultivation. The organic principles which are found in mold are ulmic acid, free or combined; in the latter case forming soluble ulmates, which are absorbed by plants during vegetation, and a black substance soluble in water, and called extract of mold, to which humus owes its color.

Although extract of mold is soluble in water, it should not be confounded with ulmic acid. It acts, during vegetation, by aiding in rapidly heating the soil which contains it, by absorbing moisture, by appropriating the elements of the atmosphere and of manures to form ammoniacal compounds, the nitrogen of which is easily assimilated by plants; and, finally, by giving rise to carbonic acid, which is dissolved by water.

In this condition, carbonic acid favors the earliest development of plants before the growth of the leaves. It dissolves the otherwise insoluble phosphates, and converts the insoluble earthy carbonates into soluble bicarbonates, thus enabling them to furnish to plants the lime and magnesia which they need.

Braconnet was the first to observe that in treating wood with potash a black acid, comparable to humus, was formed, which he called ulmic acid. M. Chevreul also found that under the influence of the alkali the oxygen of the air is rapidly absorbed. Certain trees, and especially elms, exude a brown liquid, which, according to the observations of Vauquelin and Klaproth, is an ulmate of potash and ammonia. The action of potash upon wood has been examined by M. Péligot. It results from the observations of this chemist that when a mixture of sawdust and potash is heated to about 300°, water, hydrogen, oily products, and wood-spirit are disengaged, besides which carbonate, oxalate, formiate, and ulmate of potash are formed. Ulmic acid thus obtained will be yellow if the temperature at which the reaction takes place is not too

high; but when the mixture is heated without precaution the acid is black. The final result of the decomposition of woody material by potash is carbon; and if the temperature were sufficiently high, hydrate of potash, acting as an oxidizing agent, might even cause the combustion of the carbon, in which case hydrogen would be disengaged. The yellow acid has been called *lignhumic acid;* the black acid, called *lignulmic acid*, forms with bases salts which have the general formula $M O, C^{54} H^{28} O^{6}$.

Lignulmic acid is brown, almost black; it is insoluble in water, but dissolves in concentrated sulphuric acid. It is soluble in alcohol; with alkalies it forms salts of a deep-brown color, which are uncrystallizable. The other lignulmates are insoluble, and may be obtained by double decomposition. M. Malogati obtained a black crystallized acid by heating on the water-bath for several hours a solution of sugar containing a small quantity of nitric acid.

M. Mulder has published a work on these black acids, of the principal results of which the following is a summary:

When a solution of 22 parts of sugar and 1 of sulphuric acid in 40 parts of water is heated to about 80°, a brown deposit is soon formed, which M. Mulder considers an ulmate of ulmine. This substance, treated with potash, yields ulmate of potash, and leaves a deposit of ulmine, the composition of which is $C^{40} H^{16} O^{14}$. Ulmate of potash treated with hydrochloric acid gives a brown, flaky precipitate of ulmic acid, which, being dried at 195°, is found to have the formula $C^{40} H^{14} O^{12}$.

When the mixture of sugar, water, and sulphuric acid is heated in a vacuum instead of under atmospheric pressure, a new compound is formed, which M. Mulder calls humate of humine. By acting upon this substance with a dilute solution of potash, he separated the neutral body humine, which has for its formula $C^{40} H^{15} O^{15}$. Humine is evidently derived from ulmine by oxidation, one equivalent of hydrogen having been taken from ulmine and replaced in humine by one equivalent of oxygen. Anhydrous humic acid has for its formula $C^{40} H^{12} O^{12}$.

Under the influence of an excess of acid, the preceding substances are changed into a black compound, insoluble in alkalies, the formula of which is $C^{34} H^{13} O^{9}$.

The compounds above described, treated with a current of chlorine in the presence of water, form a chloridized acid, which is represented by the formula $C^{32} H^{12} Cl O^{16} H O$, which M. Mulder named chlorohumic acid. Humate of ammonia, treated with chlorine, yields a compound still more highly chloridized, having the formula $C^{32} H^{12} Cl^{2} O^{18}$.

According to M. Mulder, the black acids which are found in *peat*, in *rotten moss*, and in *arable soils*, are identical with ulmic and humic acids, which, in those circumstances, are combined with variable quantities of ammonia.

M. Mulder extracted from mold two acids in particular, *crenic* ($C^{24} H^{12} O^{16}$) acid and apocrenic ($C^{48} H^{12} O^{24}$) acid, which had been discovered by Berzelius in the waters of Porta in Sweden, and in the ochreous deposits which furnish ferruginous waters.

Tobacco which has undergone fermentation for eighteen months, that used for making snuff, for example, contains a considerable quantity of a black acid, which has not as yet been sufficiently studied, but which strongly resembles humic and ulmic acids in many of its properties.

We see then, to sum up, that these black substances result from the decomposition of neutral substances under the influence of acids and alkalies, or by the action of the *air* or *heat*. They may be *neutral* or *acid*. They frequently contain hydrogen and oxygen in the proportion in

which those elements unite to form water. Those of them which combine with bases are to be considered as very feeble acids, which always form, with alkaline bases, colored and uncrystallizable salts. These acids, in their general properties, present a certain analogy to the resins.

By acting on glucose with ammonia, either at 100° and at the ordinary pressure, or in closed tubes and at different temperatures, M. P. Thenard obtained brown substances soluble in water and in alkaline solutions, which contain at least 10 per cent. *nitrogen.*

Dextrine, gum, starch, and cotton treated with ammonia gave M. Schützenberger analogous results. Thus gum, heated with ammonia in a closed tube for forty-eight hours, gave a residue containing from 2.5 per cent. to 3 per cent. nitrogen. Dextrine, heated under the same conditions for one hundred and sixty-eight hours, gave a substance which contained 11.5 per cent. nitrogen.—(Peluze and Frémy.)

As the successful cultivation of the cranberry depends much on the condition of the peaty matters of the bog-land used, it is imperative on those who desire to become successful growers to make themselves thoroughly acquainted with the chemical properties of peat. Many suppose that it is necessary to have the roots of the cranberry-plant imbedded in peat, losing sight of the fact that soluble and colorless fertilizing compounds are formed from the decomposition of woody or peaty matters which are easily conveyed through sand to the roots.

From the numerous experiments and observations I have made, I am convinced that the roots are injured by direct contact with decomposing or even well-decomposed peat. Fresh, moist peat, pressed on litmus paper, gives at once the reaction of an acid, even when a solution of the same will scarcely indicate its presence. Roots growing in peat have always a blackened color, although well washed, indicating the presence of an oxidizing agent; but when growing in clear sand over peat-bottoms or in gray moss, they are of a whitish or pale-yellowish color, indicating the absence of acid, and also showing a healthy growth.

Some specimens of native peat, analyzed in the laboratory of the Department, have given a larger percentage of ammonia than some of commercial poudrette; and it is probable that the ammonia, disengaged from well-decomposed peat, existed in the form of a salt, and not as nitrogen in an albuminoid. In the form of a soluble salt, it would come in contact with the roots by the capillary action of the sand. It is in this way that peat-bottoms have their value under sand. A microscopic examination of the dark-coloring matter found on the roots, after all the mechanical coloring matters had been removed, showed that their surface was chemically changed, that is, carbonized.

In accordance with instructions of the Commissioner of Agriculture, I attended the annual meeting of the New Jersey Cranberry Association, which met at the Tom's River, New Jersey, on the 9th of September last. It was composed of a large and highly intelligent class of gentlemen, nearly all of whom are engaged directly in cranberry culture. The subject which principally engaged the attention of the members was the cranberry-rot and its remedy. The effects of manuring, irrigating, salting, sulphuring, liming with gypsum and caustic lime, sanding, and the use of phosphates, were all discussed, and various opinions expressed as to their respective merits.

The secretary of the society, Mr. A. J. Rider, stated that he had tried guano, phosphates, lime, plaster, salt, and sand, all of which had proved beneficial, with the exception of salt. The methods of application have much to do with the substances employed. Weak solutions of manurial compounds will prove of more value, when frequently applied, than

those highly concentrated. Mr. D. R. Gowdy said that he had used no fertilizer until the present year, when he spread 600 pounds of guano on five acres of bog-land, but discontinued the use because he noticed that the vines were dying where the buckets containing the guano had been placed. Mr. Gowdy thought that he should pick 1,000 bushels this year where he obtained only 193 last year. Several members stated that the application of plaster, phosphates, guano, and lime has proved to be of great value in increasing the growth of new roots and vines, but that it is conceded by all intelligent cranberry-growers that an application of sand every four years to the extent of at least one inch in depth is much better. The object of sanding should not be misunderstood. It is simply to increase the growth of rootlets, branches, and leaves. It therefore increases the necessity for the application of available plant-food, which should be experimentally and intelligently applied.

It has been shown by an analysis made in the laboratory of this Department (see page 125, Monthly Report for February and March, 1875) that the cranberry contains insoluble silicates, lime, magnesia, peroxide of iron, phosphoric and sulphuric acids, chlorine, potassa, and soda. The new roots absorb these substances from the earth, and the leaves elaborate them into the proper food for the growth of the berries.

Since making my investigations on the cranberry plantations of New Jersey and Cape Cod, I am convinced that the scald and rot, so-called, of the berry may arise from dissimilar causes, although chemically considered they are practically the same, viz, the conversion of their starch into grape-sugar, a fermentable substance forming a nidus for the growth of fungi. All fruits have a tendency to decay more or less while growing under unfavorable conditions, not only before but after they are considerably advanced in size, and especially while they contain their minimum of starch. In this condition, particularly during rainy seasons, the fruit contains its greatest percentage of gum, organic acids, and water. The fruit, under these conditions and high temperature, frequently ferments or rots. In such cases, I have always been able to detect the mycelium of fungi within the berries. In the early stages of the rot, the mycelium appears first on the inner surface of the skin. When a portion of the rotting pulp is viewed under a power of about 300 diameters, its numerous ramifications are easily seen. I have frequently shown this fact to the cranberry-growers by the use of the microscope.

At the request of this Department, Mr. A. J. Rider, in August last, forwarded sixteen samples of peaty matter taken from healthy and unhealthy cranberry plantations of New Jersey. One-half of the samples consisted of sub-soil; the others of top-soil. Twelve were from the unhealthy and four from the healthy bogs. Solutions of all were made in pure water, and allowed to remain in a room at a temperature of about 75° Fahrenheit for twelve days to settle and give time for fermentation, the object being to ascertain the presence of albuminoids in the solution, or solids present. The healthy specimens were taken from the bogs of the Rev. Isaac Todd and Mr. Newman, whose plantations are noted for their healthy condition, and on which rot has not been known for the last ten years. These gave perfectly pure solutions. The peaty matters of these bogs are composed chiefly of small twigs and leaves, and are well rotted. Their solutions are colorless, and no infusorial or fungoid scum appears on their surface. A specimen solution of Mr. Todd's peat has been in my possession over twelve months. It contains about half a pound of peat to a pint of water, but has given no indications of mold on its surface during all this period, while a solution of peat from

an unhealthy bog standing by the side of it during the same time remained highly colored, and a thick scum appeared on its surface. This scum was composed of infusorial and fungoid mycelium and spores. The twelve solutions from the unhealthy bog-peat were more or less colored, some of them being thickish and soluble. These exhibited slight fermentation after standing twelve days. In fifteen days swarms of infusoria appeared in the surface-scum when viewed by the microscope.

In my first report, published in the monthly for October, 1874, I showed that the principal cause of cranberry-rot is improper cultivation. In many cases, the vines have been planted in fermenting peat-soil. But it has also been shown that high temperatures and great drought produce the same results, as was the case near Pemberton last year. There are many seeming contradictions as to the cause of cranberry-rot, and some growers have lost all confidence in human judgment on the subject, and are disposed to leave the cultivation of the cranberry to nature. The following will illustrate some of the principal facts which have led to great confusion of ideas among growers: H has a bog always covered with water; his berries never rot. B, his brother, has planted a bog, similar as to quantity of water, with vines selected from the plantation of H. After copious rains and hot suns, the berries of B rot while those of H remain in perfect condition, although growing apparently under the same general conditions. This seems inexplicable. But the bog of H is surrounded by high bluffs which pour out a never-ceasing supply of comparatively cold water. The roots are kept always cool, but not too cold for growth. The fruit is longer in maturing than that of some of the neighboring plantations differently situated; but the berries of H ultimately become fully matured, very firm, and highly charged with starch. B has no high bluffs to supply him with cool water. On the contrary, his bog lies in an open plain, subject to the effects of a scorching sun. The temperature of the water becomes too high for healthy growth, and his berries consequently succumb to these unfavorable conditions.

There is conclusive evidence that matured berries will grow only on matured vines. It is the experience of all growers that the berries of vines two or three years old, however large and beautiful, are not good keepers; while the same vines when they become aged, under ordinarily favorable circumstances, will produce good-keeping fruit. As a general rule, it is found that the old healthy bogs produce the most reliable fruit.

When at Pemberton last year, I expressed the opinion that the cranberries growing in that neighborhood rotted from drought and high temperature. Nearly all of the soil in that district seemed to be free from bad odors; but, under converse conditions this year, rot of the berry occurred on the same plantations. One of the most intelligent growers of Pemberton informed me that the rot commenced immediately after the heavy rains of August.

The cranberry-plant is very hardy; its leaves are glossy, and strongly resist climatic changes. Its wood has a solid texture, and withstands very cold weather, although it may be killed by a severe frost. The roots, when planted in pure sand, or when growing in gray moss, have a translucent, whitish appearance, and are not easily broken. Unhealthy roots are of a dark-brown or blackish color, and may be ground into a pulp between the fingers. The blossoms and berries are, however, very much subject to blight or rot. When we take into consideration the large amount of water contained in the best varieties of the cranberry, it need not be surprising that inferior kinds should succumb under even

slightly unfavorable conditions. The following are the results of an analysis, made at the Department, of a dark-colored and hardy variety of the cranberry, taken from the plantation of Messrs. C. G. and E. W. Crane, of New Jersey, known as the Cape Cod Early Black-Bell:

Moisture	86.50
Organic matter	13.25
Inorganic matter	0.25

The tuber of the common potato, which is very succulent, has only 74 per cent. of water, and with that amount is very liable to ferment when subjected to a moist atmosphere followed by high temperature.

When the cranberry is well formed, firm in texture, and ripening, sudden changes of conditions should be avoided, so as to prevent a renewal of root and wood growth when it is desirable to bring the berry to maturity.

The following letter from Mr. Bishop, one of the most noted cranberry-growers of New Jersey, will be read with pleasure by all interested in cranberry culture:

SIR: In answer to your inquiries in regard to the cranberry-rot on my plantations this season, I would say that on the large one called Oxycoccus, visited last year by Mr. Thomas Taylor, Microscopist of your Department, I shall have a larger, perhaps much larger, crop of very fine fruit than I had the year he visited it. I have found soft berries on several small spots of the plantation, but not in sufficient quantity to cause any serious fears of permanent injury. We had never noticed or thought anything about soft berries at Manahawkin until last season; but the great interest now felt in this matter has caused us to inquire carefully into the past history of wild and cultivated bogs in our vicinity. We have recalled to memory two or three small spots of bog on this plantation which produced a few quarts each of soft fruit several years since, yet on those spots we have had fine fruit continually since that time.

Mr. Charles Hinchman, of Taunton, was here about the first of the month, while I was absent. His experience is large, and his judgment so good, that I always listen with interest to what he says about cranberry-culture. When he saw some berries on young vines growing on the hot dry sand which covered the peat, he said that the softness of the berries was not occasioned by the causes which usually produce the "rot," but was the result of the intense heat of the sun. On all my finest-producing beds of old vines, which have yielded hard fruit for years past, I remember that the vines when young produce soft berries, but after they became well matured and matted—say, when four or five years old—the fruit yielded was of good quality, and has continued to be so to the present time.

While I cannot help feeling that the Microscopist has found the main cause of the "rot," I am still forced to believe that much of the soft fruit found on very young vines is the result of the very hot rays of the sun and moisture, independent of fermentation of imperfectly-drained bog-bottoms.* We are harvesting at present a very fine crop of cranberries. The fruit is larger, more highly colored, and more abundant than that of last year, despite the most unfavorable season for their cultivation that we have ever known. Cranberries taken from the vines, and left for two or three days on the black peat along the ditches, would, in a short time, become throughly baked like apples that have been cooked in an oven.

Mr. A. J. Rider, secretary of the New Jersey Cranberry Association, and an experienced cranberry-grower, writes to the Commissioner of Agriculture as follows:

DEAR SIR: I subjoin a few facts, drawn from experience and observation, concerning the insect-enemies common to the cranberry. Those with which we have had special experience are the grasshopper, cricket, vine-worm, and berry-worm. We have succeeded in destroying these worms by thorough flooding. On a portion of the park cranberry lowlands, they at one time became very numerous in spite of the ordinary winter-flooding; but by removing the water and exposing the lands for a few weeks to the rays of the sun in April, and then again submerging them, the worms were completely destroyed. When water is not at command for flooding, we think they may be

* This statement is doubtless true. There is probably a larger proportion of water in the vines and berries of young vines than there is in those of matured vines and berries of the latter. In grape-culture, it is believed that the grapes are not matured until the branches are matured: ripe wood makes ripe fruit.

controlled by night-fires on the borders of the bogs at the period when the moth is out. Many moths are destroyed by the flames, but more are attracted away from the plantation by the light, and do not find their way back.

Grasshoppers and crickets have given us the most trouble. Their eggs, being impervious to water, cannot be destroyed by winter-flooding. If they could be submerged at the period of hatching, we have no doubt that they would succumb; but as the hatching occurs at a period when the vines are in bloom and setting with fruit, flowing cannot be employed without loss of the crop. Poultry of all kinds we have found very beneficial in keeping the grasshoppers in subjection; but we have found no animal sufficiently sharp-eyed to capture the hiding cricket except the Guinea fowl. Both the grasshopper and the cricket are fearfully destructive, as the former attacks the berry when very small, and the latter eats only the seeds at the time of ripening.

If you can give us any assistance by way of remedy for these pests, we shall be greatly obliged.

In the Third Annual Report of the New Jersey State Board of Agriculture for 1875, page 66, the following statement appears:

Thus far, the efforts of the New Jersey Cranberry Association to discover a remedy for the rot have been unsuccessful. Liming has not appeared to be in any degree effective. Both in regard to the malady and in the cure, or preventives suggested, there is a very wide range of opinion, based upon observation of localities having very great differences of conditions.

It is doubtless true that the Cranberry Association has failed to discover a remedy for the rot of the cranberry, and that among its members there is some difference of opinion as to its cause and cure. But it has been publicly acknowledged by the association that peaty fermentation of cranberry-bogs had never been considered a cause of cranberry-rot until it was demonstrated by the investigations of the Microscopist of this Department; and the leading cultivators of the cranberry in New Jersey have acknowledged by letter, from time to time, to the Commissioner of Agriculture the great benefit of his labors to the State of New Jersey; and, furthermore, at a late annual meeting of the association, the president stated that the investigations made by him (the Microscopist) would save hundreds of thousands of dollars to the cranberry-growers of the State. All this is wholly overlooked by the writer.

But "liming [he says] has not appeared to be in any degree effective." The fact is that *liming has never been thoroughly tested.* This statement may be rather startling to some cranberry-growers, as it is well known that Dr. Merrman has used forty bushels of lime to the acre, and others have probably done as much. This leads to the question, For what purpose was the application of lime recommended? Lime may be employed to prevent the decay of wood and other organic substances, or it may be employed for their decomposition. We have examples of the first in ships and wooden structures used in the transportation of burned lime. In these cases, the lime is in excess of the organic matters, and the moisture of the wood is absorbed by the lime, and all the proximate principles of the wood are, in consequence, preserved; but if the conditions are reversed, and water and organic fibers are in excess of the newly-burned lime, the woody fibers will decay. Lime may be employed to reduce vegetable substances, to correct acid in the soil, for the solution of silica, or for the decomposition of salts of iron. The sulphate of iron is often found in peaty soils, in which case the lime would combine with the acid, forming sulphate of lime, and oxide of iron would be precipitated. But the main use of lime, as recommended to the cranberry-growers, is to correct the acid condition of the peaty soil. Had they, after a trial of one or two years, reported that the acidity of the soil had been corrected, yet without practical results, such a report would supply a good basis for criticism; but the cranberry-growers have made no such practical examination of the soil since the lime was applied, and they are not therefore prepared to make an intelligent

report on the subject. All that is asserted is that the berries on the newly-laid-out wet bogs rot as much as ever, while those on the superior old bogs do not.

The value of lime to wet cranberry-land can only be ascertained by continued experiment, and a careful observation of results.

The bad condition of the bog-lands was discovered by digging up the subsoil, by its taste and smell, by chemical analysis, and by its comparison with soil known to produce uniformly healthy fruit. Some soils have been found so bad as to be practically irreclaimable. As has been stated heretofore, the composition of cranberry-land varies very much in New Jersey, not only as to its composition, but as to the quantity and quality of its peaty matter. It varies in thickness from 3 inches to 6 feet. It is obvious that if forty bushels of lime are necessary to bring into proper cultivation 3 inches of bad soil, it would take 160 bushels for a bad soil 12 inches thick.

But it has been found that an uncultivated bog near the plantation of Mr. N. H. Bishop, Manahawkin, N. J., which was 6 feet thick, was nearly devoid of sulphureted hydrogen odor and acid condition; and, with the bountiful supply of water at command, irrigation and sanding would supply all the elements necessary to successful cultivation.

The black sand of the cranberry-lands of New Jersey contains about 2½ per cent. of vegetable matter. Where this is present, no lime should be used; but irrigation is always necessary. The report of the New Jersey State Board of Agriculture for 1875, page 28, gives an analysis of nine varieties of soil of that State, consisting of gneiss, magnesian slate, red shale, marl, soil of drift of South Jersey, soil of alluvium, sea-border, and soil of the tide-marshes. The *organic matter* contained in these soils is respectively 6.89, 5.52, 5.12, 7.45, 12.56, 1.90, 1.61, 4.14, 7.45 per cent.

But the soil of the cranberry-bogs on which lime has been applied at the rate of forty bushels to the acre is composed wholly of vegetable matter. In the same report, page 53, appears the following statement of an experiment made with lime by David Petit, esq., Salem, N. J.:

> About twenty-five years ago, I had a field of the out-cropping of the middle green-sand marl-bed covered with Pennsylvania slacked lime, one hundred bushels to the acre, before seeding with wheat. I was advised not to do so, that it would injure the crop, for lime applied directly to the wheat-crop would prevent its ripening, and cause it to rust. But the land being of a dark color, and early, the crop was good, without rust, and I had a good stand of young grass; but the next year the action of the lime with or upon the marl (although it was the poor out-cropping) was strong on the young clover, gave it such an impetus in growth that it shot up above the timothy, then fell and smothered it out long before mowing-time. It is stated by William G. Woodnutt, page 54, that he used nine hundred bushels on one-third of an acre, for a compost for low meadow, to great advantage. He says: "Nine hundred bushels on one-third of an acre will make nearly seventeen bushels to the rod, which will cover the land an inch deep. If the land was plowed six inches deep, it would make the compost one-seventh lime. The result of the compost when applied to the meadow was very satisfactory."

The president of the West Jersey Agricultural and Horticultural Association, Salem County, page 55, says:

> Our farmers are using lime freely. * * The quantity used per acre is from forty to sixty bushels of slacked lime. * * * Many use it thus: The strips of land where the lime lay in rows were plowed, lime and sod, under together. *No result here till after years.* In fact, its use seemed narrowed down to this: get the lime on.

Mr. William Statesir, esq., of Freehold, page 56, writes that he uses seventy-five bushels to the acre with advantage.

We have evidence that, in the Connecticut River Valley, from two hundred to three hundred bushels to the acre have been used to advantage. In this valley, doubtless, a large amount of organic matter is deposited yearly, and in this case a larger amount of lime may be profit-

ably used. In the nine cases of anaylsis given, the organic matter in the respective soils varies from 1.90 to 12.56 per cent.; the whole giving an average of about 5.84 per cent. The farmers use from forty to one hundred bushels to the acre with advantage. Now the cranberry-bogs will average probably eighteen inches of soil composed almost wholly of organic matter. If, then, seventy-five bushels are required to the acre, containing 5.84 (say 6) per cent. of organic matter, how much should a cranberry-grower use whose peaty-soil contains 75 per cent.? It would require 937½ bushels to the acre to equal that used by the New Jersey farmer; but, as a large portion of the soluble lime would be washed away annually by irrigation, one thousand bushels per acre would scarcely equal the farmer's application of forty or fifty bushels.

But, fortunately, these calculations do not apply to all cranberry-lands, since some require little or no lime; and, as stated in a former report on this subject, the use of lime in some cases would be injurious. Irrigation and heavy sanding are all that is required in many cases for improvement of soil and correction of acid. Each cultivator must be the judge as to the quantity of lime and irrigation required, guided by the condition of the roots of the vines and state of the soil.

The investigations made by the Department of Agriculture will lead in all probability to better selections of land for this culture in the future, and in this way hundreds of thousands of dollars may be saved to the cultivators of cranberries in the United States.

Mr. H. A. Green, of Atco, N. J., June 5, 1876, forwards to this Department several sheets of natural paper which grows on his cranberry-bogs. This paper consists wholly of the mycelium (spawn) of a fermenting fungus, demonstrating that the peaty matter of his bog needs liming and irrigation; and no stronger proof could be advanced in favor of the expressed views of the Department in relation to cranberry-rot, and the value of its investigations, than the growth of these matted sheets on the flooded bogs.

We again recommend sanding, lime, and irrigation as the best means of improving cranberry bog-land.

It has long been observed that some varieties of cranberries are remarkably good keepers, while others rot quickly; and especially is the latter the case with the berries of young vines, although all the varieties of cranberry-vines prove very hardy as regards high and low temperature. An analysis made by a careful and able chemist would probably demonstrate a great diversity in the proportion of the earthy matters in the vines and berries of even the best varieties.

The long keeping of fruits doubtless depends, in some degree, on the assimilation of earthy salts during the process of growth.

In support of the conclusion that lime acts as a direct food of our crops, is the fact that it is generally found in the ash of our cultivated plants, and that the earth, when absent or present in very small proportions in our soils, is beneficially added to them as a manure. The amount of lime present in the ash of various plants was some time since determined by Professor Way.*

In 100 parts of the ash of the following plants, he found—

Of the grain of the creeping wheat	6.76
Of the straw and chaff	7.46
Of the grain of chevalier barley	1.48
Of the grain of potato-oats	1.31
Of the chaff of oats	8.65
Of the grain of rye	2.61

* Journal of the Royal Agricultural Society, vols. 7 and 9.

It is noticeable that the amount of lime present in the ash of various specimens of wheat was the most considerable—8.21 per cent. in some Hoptoun wheat grown on siliceous sand, and that in another specimen of the same wheat grown on a chalk soil, the ash only contained 1.83 per cent. of lime.*

In the ash of various green crops, Professor Way found, in 100 parts, the following amount of lime: †

	Parts.
Red-clover hay	35.02
White-clover hay	26.32
Sainfoin, (in flower)	24.30
Sainfoin, (in seed)	29.67
Italian rye-grass, (in flower)	9.95
Italian rye-grass, (in seed)	12.29
Flower of hope, (mean of three specimens)	19.33

The amount of lime in the red and white clover did not vary in different specimens grown on siliceous or clay soils. It would have been reasonable to expect a large proportion of lime in the sainfoin, which flourishes best in a calcareous soil. The specimen, however, analyzed by Professor Way was grown "on a light gravelly loam, with a subsoil of gravel above chalky clay."

In a ton of the ordinary roots and legumes (the entire plant) Professor Way found the following amount of lime: ‡

	Pounds.
Turnip	3.70
Mangold	0.87
Carrot	8.24
Kohl-rabi, (bulb)	10.20
Kohl-rabi, (leaves)	30.31
Pease	2.28
Pea-straw, (2,989 pounds)	86.80
Beans	2.75
Bean-straw, (2,270 pounds)	22.25

So that, as the professor remarks of the roots, 20 tons of bulbs and 4 tons of tops will require of lime—

	Pounds.
Turnips	90
Mangolds	21
Carrots	197

The ash of the various natural grasses was found by Professor Way to contain from 14.94 per cent. (the *Phleum pratense*) to 3.94 (the *Alopecurus pratensis*;) in that of the artificial grasses he found from 45.95 per cent. (the *Medicago sativa*) to 13.40, (in the *Achillea millefolumem.*)§

It is noticeable that the amount of lime present in a plant varies considerably in its different portions. Thus, the ash of the *Kohl-rabi* contains 10.20 per cent. in that of the bulb, but 30.31 in the ash of the leaves. The ash of the root of the carrot yielded 5.64 per cent. of lime, that of the leaves 24.04. The ash from the flowers of the hop 9.59 per cent., that from the leaves 30.73 per cent., that from the vine 23.71. The ash of the potato analyzed by Professor Way contained in that of the tuber 4.50 per cent., in that of the haulm 29.86.

It is true that it is not as pure lime that the earth is found in plants; it is in combination with various acids, or chiefly as carbonate, phosphate, or sulphate of lime.

The action of lime when applied to soils abounding in inert, organic matter, like the peaty, is not only to furnish a supply of lime to the plants which tenant such soils, but caustic lime tends to bring any dead vegetable

* Journal of the Royal Agricultural Society, vol. 7, p. 666.
† Ib., vol. 9, p. 139. ‡ Ib., vol. 8, p. 199. § Ib., vol. 2, p. 534.

matters which they contain into a state of decomposition, so as to render them more soluble in water, and so more available as food for growing plants. It is in this way that we account for the success of the mixture of lime with the scrapings of ditches, collections of weeds, pond-mud, &c. This compound, after allowing it to remain in a heap for two or three months, I have always found to be a very useful manure.

In South Wales lime is extensively used, especially when the stone from which it is obtained is plentiful; but even where it has to be fetched twenty to thirty miles it is yet used in smaller applications. The ordinary amount employed varies with its price, from 60 to 250 bushels per acre.

BLACK-KNOT.

In the bulletin of the Bussey Institution for 1876, page 449, the following appears: The best, and, so far as we know, the only correct, statement of the etiology of the black-knot was made by Mr. C. H. Peck, who, as we have already remarked, was the first to describe the conidial state of the fungus. He also first showed, definitely, when the ascospores ripened, and correctly reasoned that the knot was caused by the *Sphæria morbosa*, and that the fungus on plums and cherries was the same.

In a letter written by Mr. C. H. Peck, dated February 16, 1874, and addressed to Dr. Vasey, Botanist of this Department, the following paragraph appears:

> Mr. Taylor, Microscopist of your Department, in his article on black-knot, has demonstrated one fact of which I am glad, though I fear he has done it unwittingly. His Fig. 6 shows conclusively the connection between the Cladosporium and the sphæria; a connection which I have long suspected, and to which I refer in my papers on this subject.

And in a letter addressed to Mr. Taylor, dated Albany, March 9, 1874, Mr. Peck says:

> I am much interested in your investigations of the black-knot, and thank you for your favor of the 6th instant.
>
> The chief part of the excrescence is, without doubt, made up of the tissues of the host-plant, as shown by your specimens, and this unusual development of the tissues must have been a cause, which, I believe, should be sought in the irrigating or stimulating influence of the mycelium of the fungus. This need not necessarily permeate the whole mass, for it is well known that the egg of an insect, deposited in the tissues of plants, sometimes causes an excrescence very many times larger than itself. Mr. Vasey kindly sent me the Report of the Department of Agriculture for January, and I was glad to see that your Figs. 5 and 6 show the actual connection between the Cladosporium and flocci, * * * a connection which I had long suspected, *but had never actually detected.*
>
> These flocci often bear spore-like bodies, which, in such like cases of dimorphism, disappear by the time the true spores are perfected. Doubtless the specimen you figure was young or, for some reason, sterile.
>
> You will find the real spores of the sphæria in sacks, included in the perithecia.

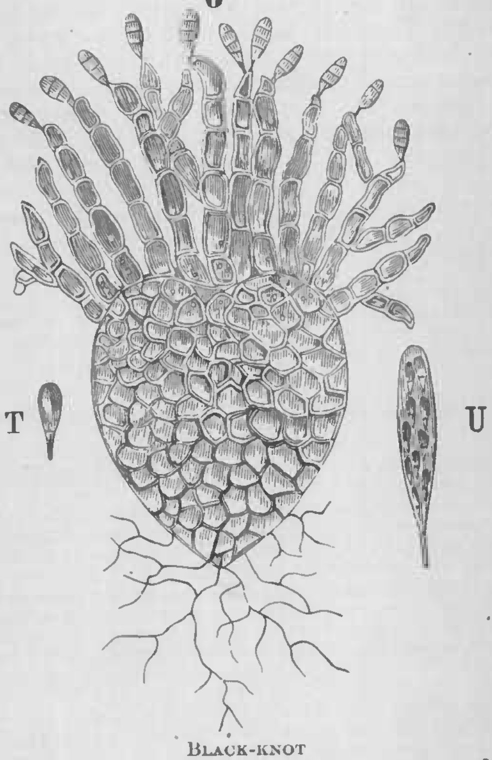
Fig. 6 represents a typical specimen of a parithecium of black-knot. U the sack which contains the sporidia* T. These sacks (asci†) contain eight sporidia. When the perithecia are submitted to the action of nitro-muriatic acid they become translucent, and their cellular structure is seen as represented.

* Sporidia reproductive cells produced within the asci.

† Asci are sacks contained within the peritheci.

PLATE XV.

6



BLACK-KNOT

Of the Plum and Cherry trees (*Sphæria morbosa*, Schweinitz).

THE SHEEP AND WOOL OF THE WORLD.*

By J. R. Dodge.

INTRODUCTION.

Progress of the century in sheep-raising; Effect of circumstances in modifying breeds; Growth of demand for wool and of supply.

1. The sheep, first among animals to be domesticated for the service of nomadic man, is of equal utility to the human race under the highest civilization; and the record of progress in that civilization in the past century marks a similar stride of improvement in the races of sheep. The flocks of a hundred years ago would be discarded to-day, even by the sheep-masters of the South American savannas or Australian hills, as practically worthless. They yielded a fleece smaller and of inferior quality, with less meat; were comparatively scrawny and ungainly in appearance, with long legs suited to a nimble search for food; and they required a longer period for growth and development. The change has been one in harmony with the practical aspects of recent general progress by which the fleece has acquired evenness, the fiber adaptation to the popular want, the carcass a larger proportion of profitable meat, with growth and maturity quickened to enable the nimble sixpence to surpass the slow shilling in the race for profit in meat-production.

Such is the record of sheep-husbandry in this country. It is the same in Europe and in other parts of the world where the enterprise of the European race has assumed the control of wool-production; and there is little furnished to the manufacturers of Europe and America that is not yielded to the care and capital of the European race. An examination of the wool-bearing animals of the temporary show at Vienna, and of the still more extensive collections of wool at the great exhibition, illustrates the same phases of improvement which have characterized wool-growing in this country.

2. Yet there are great differences in the minor details of this improvement that are suggestive and instructive, illustrating the necessity of adaptation to all surrounding circumstances. These differences not only constitute national peculiarities in sheep-breeding, but require the careful attention of the individual breeder who would make the most of his situation. In observing the methods of sheep-husbandry in different countries, and the quality and style of different breeds of sheep, the most obvious thought suggested is the governing force of circumstances, of climate, soil, status of agriculture, and local demand for meat or wool, in forming the prevailing style of sheep, whether of grade or pure breed. The deduction is naturally made that the type of sheep found in any given locality is, therefore, the animal best suited to that region. Such a conclusion should be adopted very cautiously and with many limitations; otherwise progress would be impossible. The fact that modification, change for the better generally, is plainly seen in nearly every distinctive kind of sheep found in the civilized and progressive countries of the globe, to obtain meat of a better quality, or more in proportion to feed consumed, or wool either in larger quantity or better adapted to the changing requirements of manufacture, should

*A report to the Secretary of State as honorary commissioner to the Vienna International Exposition, and to the Commissioner of Agriculture as statistical commissioner.

be deemed conclusive of the necessity of keeping abreast of the changing conditions of sheep-husbandry. In a new country like ours, the sheep of which all owe their origin to flocks of foreign countries, it is necessary not to look for guidance to the sheep accidentally brought into a particular section, but to the circumstances of soil and situation, of climate and culture, which affect production and profit. Yet we must not go to the other extreme and condemn as erroneous the practice of particular countries, differing from our own methods, which are usually in the main the best for those countries under existing circumstances.

3. With the progress in manufactures tending to variety and cheapness, the increase of steam-carriage facilities throughout the world, and the advance in the wages of the various industries, there has been a constant and rapid enlargement of the demand for wool. In this country the value of woolens manufactured has advanced from $4,413,068 in 1820 to $155,405,358 in 1870. In England, in addition to the home-grown product, the foreign wool-supply has increased from 8,609,368 pounds in the first year of this century to 342,986,862 pounds in 1874. Indeed, the factory-system may almost be deemed the growth of the past century. During this period, the clothing of the masses in civilized countries has ceased to be the province of home manufacture and the product of hand-looms, and has been left to organized effort, aggregated capital, and improved machinery. Seventy years ago, two-thirds of the British imports of wool were from Spain, and nearly all the remainder from Portugal; now two-thirds of the importation is from the Australian antipodes; but the Spanish supremacy of those days compares with the Australian superiority of the present as six millions of pounds with two hundred and twenty-five millions; and the total importation is nearly forty times that of the beginning of the century. The advance in the British consumption has been wonderful, yet the exports of wools, yarns, and other manufactures of wool have shown a great increase, amounting in declared valuation to £9,387,455 in 1816, and to £39,122,686 in 1872.

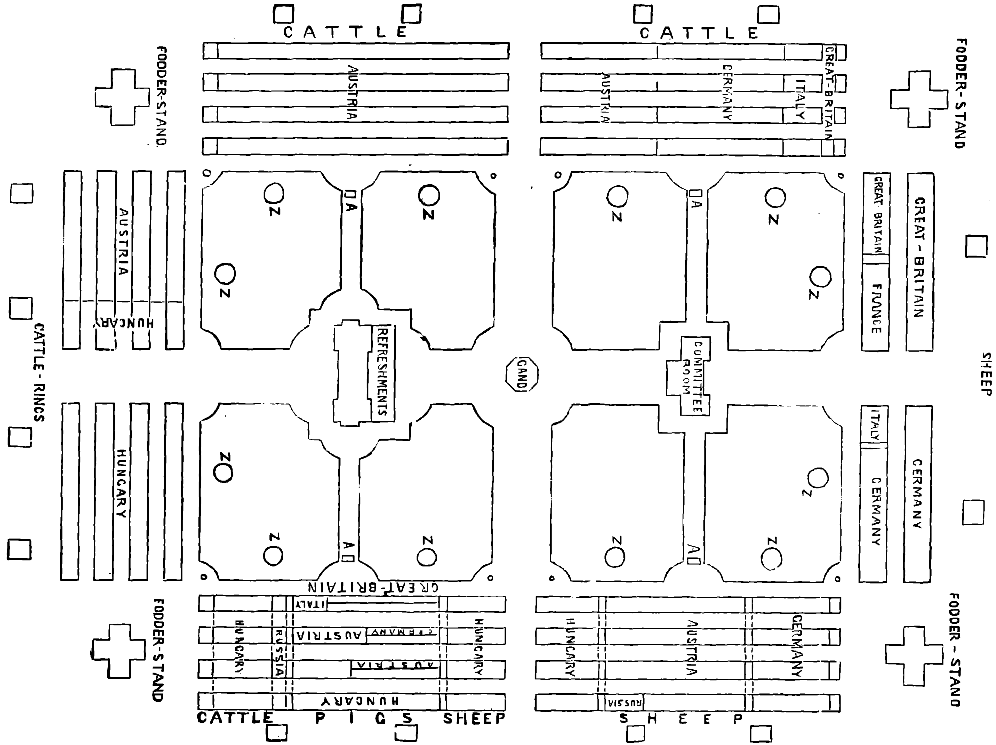
CHAPTER I.

THE INTERNATIONAL SHOW OF SHEEP.

EXTENT AND CHARACTER OF EXHIBITS; PLAN OF YARD; PREDOMINANCE OF MERINOES; NUMBER OF ENTRIES FROM VARIOUS COUNTRIES; TENDENCY TO MUTTON-PRODUCTION; BRITISH ENTRIES; GERMAN ENTRIES; CHARACTERISTICS AND GRADE OF MERINOES; AUSTRIAN EXHIBITS OF MERINOES AND COTSWOLD MERINOES; HUNGARIAN SHEEP; RUSSIAN SHEEP.

4. In connection with the International Exhibition at Vienna, a temporary show of domestic animals of all nations was projected, to continue from the 31st of May to the 9th of June inclusive. The countries nearest the place of exhibition naturally contributed most liberally, and Austria, on account both of proximity and direct interest in the success of the effort, made the largest contributions. Hungary, as a branch of the Austrian Empire, promptly assumed the second position. The Empire of Francis Joseph actually supplied nearly six-tenths of the sheep, five-sixths of the cattle, and above six-tenths of the swine, Hungary alone sending nearly half of the latter class. The number of sheep entered for exhibition was 1,504, contributed as follows: By Austria, 467; Hungary, 431; Germany, 377; England, 135; France, 69; Italy, 22; Russia, 3. Russia had only a single entry in each class, and

PLATE XVI.



A A Latrines.

Z Z. Tents.

SHOW-YARD OF LIVE SHEEP.

America was unrepresented, as were Asia, Africa, and Australasia. This feature of the great international show was extremely interesting to the farmer and the naturalist, and especially to the woolen manufacturer.

5. The display afforded an opportunity of comparing European breeds, such as few of the visitors had ever before enjoyed. The arrangement of the animals was systematic in the plan, which is presented in the accompanying diagram, (Pl. XVI,) but confused and unsatisfactory in its actual execution, making the work of the judges slow and difficult.

6. The Merino families of sheep greatly predominated, as they do in all countries in which wool rather than mutton is the aim of the breeder. England, with a dense population to feed, and lands of high price, sent only long and middle wools. Germany contributed mainly Merinoes, thorough-bred and cross-bred, pure bloods and the ameliorated "land-sheep" of the country, with a fair proportion of the various breeds of English mutton-sheep. France sent only the Rambouillet Merino, which is the nearest approach to the meat-producing types of Great Britain yet attained by the wool-yielding race of Spain. Italy was represented only by the Bergamask sheep, an ungainly race, bearing a medium wool, and characterized by long legs, long and pendulous ears, and white face and fleece. There were no living representatives of South America, Africa, or Australia, but the wool from those countries in the exposition was nearly all of the Merino type.

7. The predominance of Merinoes of the various families was very marked among continental exhibitors. Of the 377 animals from Germany, 291 were of this blood; 27 were Southdowns; 26 Oxfordshires; 8 Shropshires; and the remainder Suabian, Franken, and "Haidesnucke." A still larger number of Merinoes, though not averaging so high in purity of blood and other points of excellence, are found in the Austrian contribution—not less than 322 being entitled to this distinctive name from the predominance of Spanish blood. The Southdowns appeared to hold the next place in public estimation, having 68 Austrian representatives, with a strong strain of Down blood in no less than 25 placed in the Merino class, and Cotswold-Downs, Southdown-Paduaner, and Southdown-Birki. The Zackel race and "Gadegast" sheep complete the list of 467 animals entered. Hungary presented 322 Merinoes and grades in a list of 431, the black Siebenburger, the Wallachian, Zackel, Zigara, and other natives, constituting the remainder.

8. While this predominance of a single race is so evident, it is true that a tendency has been felt for years, growing stronger yearly, toward a larger infusion of English blood, and a greater comparative importance to meat-production; and the result of this exhibition, most of the English representatives being distributed for breeding purposes, will be a manifest strengthening of this tendency. The improvement of Merinoes, so marked in the last twenty years, has been in the direction of larger yet more compact frames, enlarged flesh-taking capacity, and earlier maturity, with a coarser but heavier and more profitable fleece. Not less active than in the United States, for a generation past, has been the effort to mold the original flocks to suit the changed demands of the woolen manufacture and the pressing requirement for meat. The examination in detail of the material of the exhibition of the several countries will illustrate these aspects of sheep-breeding in Europe.

9. ENGLAND.—The Southdowns take the lead in point of numbers, with 40 animals; 20 from the flock of Lord Sondes, Elmham Hall, Norfolk; and as many from the Merton flock of Lord Walsingham. The former represented a flock of 1,200 pure-bred Sussex Downs, founded in 1823,

and distinguished for symmetry and thriftiness. They were sold to go to Hungary, Galicia, North Germany, and Russia. The latter, from a flock of world-wide renown, were sold to the Archduke Albrecht for his estates in Austria; to Count Fries, Czernahora, Moravia; Baron Magnus, Dresha, Saxony; and to breeders in Russia. The Elmham Hall rams yield fleeces of 8 to 10 pounds, and those of Merton Farm are quite as heavy.

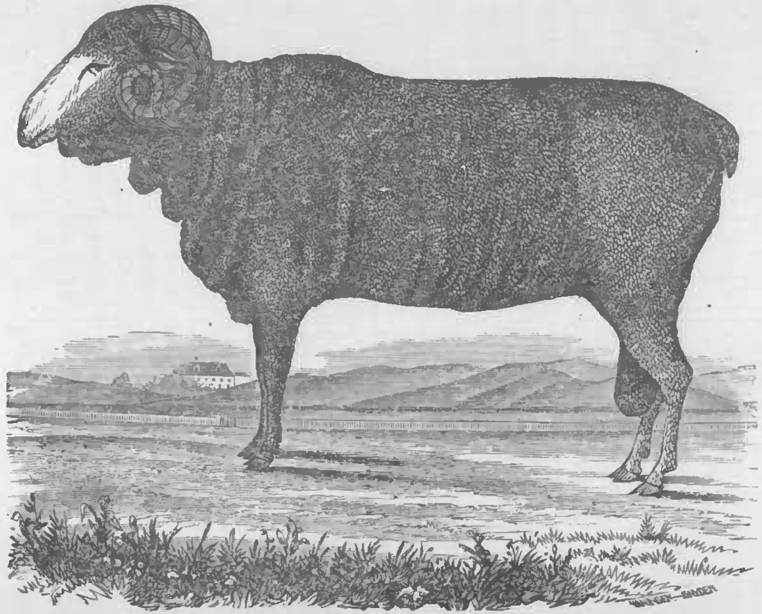
The Cotswolds numbered 26 in three entries. Those from the Agricultural College Farm, Cirencester, Gloucestershire, 12 in number, representing a flock of 200 ewes and 60 rams and 180 fattening-sheep, illustrated well the especial aims of breeding at the college-farm, viz, a heavy fleece, depth of flesh, and great hardiness. The fleeces weigh from 13 to 20 pounds. The rams are in great request for cross-breeding with Southdowns, Hampshires, and mountain-sheep, to give length to the fiber and weight to the fleece. There were also eight from Mr. T. Beale Brown, Salperton Park, Gloucestershire; and six from Thomas Fulcher, Elmhall, Norfolk.

There were 13 fine Hampshire Downs from Messrs. Robert and John Russell, of Kent, producing fleeces averaging 9 pounds, and 16 long-wools yielding an average of 15 pounds. From Lord Chesham's flock of 350 Shropshires, in Bucks, came nine representatives, with 12-pound fleeces. Two fine Oxfordshire rams, bred by Mr. John Treadwell, Bucks, valued at £20 each, represented a flock of 700, of which the ram-fleeces usually weigh 18 pounds. There were some fine sheep from Lincolnshire, improved by crossing, for the production of long, lustrous combing wool, with fleeces weighing from 15 to 20 pounds.

The English section of the exhibition attracted much attention and ready purchasers. Seven of the Shropshires of Lord Chesham, 6 ewes and 1 ram, went to the estate of Baron de Rothschild, at Witcham, for £100. Two rams of the same flock were taken by the Duc de Coigny at £40 each. The Hampshire Downs and Kentish Longwools, of the Messrs. Russell, were scattered through Prussia, Austria, Hungary, and Russia. The Lincolns, of the Messrs. Dudding, were all sold, some bringing £40 each, to Germany, Hungary, and Italy.

10. GERMANY.—The Merinoes of Germany have been greatly modified in later years by crossing, so that it might be impossible to find a flock with the precise characteristics of twenty years ago, though bearing the same name. The Electoral, Negretti, and Rambouillet are mingled according to the whim or judgment of the breeder, the better to suit his views of the demands of the market for wool or meat, and the result is the loss of the distinctive character of the originals. It might be impossible to find at the present day a counterpart of the Saxon ram of the Electoral-Escurial blood, an engraving of which (Pl. XVII) is reproduced here from the United States Agricultural Report of 1847, as drawn from nature by Charles L. Fleischmann, esq. The spindle legs have been shortened, the flat ribs rounded, the bald head covered, and the very fine super-Electoral fleece has been displaced by longer, coarser, and more abundant wool, which brings more money at a slightly reduced price per pound. This was the prize-ram of Von Thaer's flock, one of the best and most highly improved in Germany. The wool was of excessive fineness, very short in staple, though not of full length when the drawing was made in August. The folds and wrinkles so fashonable since, were even then deemed desirable as indicative of a large proportion of fleece to live weight; indeed, we are told that the Spanish shepherds were wont to kill the tight-skinned lambs of the

PLATE XVII



THAER'S ELECTORAL-ESCURIAL RAM OF 1845.

best flocks, fearing their influence in producing light and thin fleeces. Nor would it be easy to find the Negretti type of those days.

11. The Merino of the present day, whatever its name, is a producer of a good quality of cloth-wool, is compactly and strongly built, with a head of good breadth and medium length, a short, full neck, a straight back, round barrel, and good breadth of shoulders and rump. The present flocks represent usually the grades of wool between the Prima and Electa, of the following scale of degrees of fineness, viz: (1) Prima, (2) Super-Prima, (3) Electa, (4) Super-Electa, (5) Super-Super-Electa. In Saxony seven degrees have been recognized, an additional "super" is employed, while "Secunda" comes in below Prima. The heads, belly, and feet of approved types are well covered, and evenness of fleece is deemed an important consideration. The wool is of medium length and fineness, nearly uniform upon all parts of the body, the fiber closely set, and the "closure" of stubble as nearly perfect as possible to protect the fleece from dirt.

12. A brief reference to the prominent breeding-flocks represented in the exhibition will indicate the status and tendency of wool-breeding in Germany. Among the best Merinoes exhibited, though bearing fleeces remarkable for weight rather than fineness of fiber, were those of the flock of Herr Robert Gadegast, of Thal Oschatz, Saxony, which includes 1,000 animals kept as breeding-stock, the males yielding fleeces of 8 to 10 pounds, the females clips of 4 to 5 pounds of close and even fiber, good felting property, with abundant yolk.

The old flock of Herr R. Holtz, Saatel, Barth, Prussia, which has been in course of improvement for more than half a century, and now numbers 1,500 large sheep, good feeders, yielding a long fiber suitable for carding, was well represented. Washed fleeces average about 7 pounds. This flock sprang from Kliphausen in Saxony, and in 1813 was transferred to Mecklenburg, and in 1817 to Pomerania.

Herr C. von Levetzow, Koppelow, Mecklenburg, from his flock of 800, founded by the Count of Halm-Remplin, contributed sheep of Spanish origin, with ewe fleeces of 6 to 9 pounds of fine wood.

Among the stock noted for fineness of wool, the flock of Herr Rudolf Mens, Jordansmuhl, Silesia, presented fleeces of exceptional fineness weighing about 3½ pounds. Herr Alfred von Radzinski-Rudno, of Lipton, showed Electoral sheep of Prussian Silesia, from a noble flock of 1,000, bearing fleeces of superior fineness, with an average weight of 3 pounds.

Herr Ludwig Schröder, Buckholz, Brandenburg, Prussia, exhibited specimens of a carding-wool flock of full-bred Merinoes, originally obtained from France.

A Silesian flock of 200 founded sixty years ago upon the stock of Prince Lichnowsky, and afterward crossed with Negretti rams, was represented by the entry of Count Arthur Prinzenstein, Hoschutz. An excellent quality of cloth-wool, weighing about 5 pounds per head, is the result of breeding on this estate.

A notable flock, at times including 1,100 pure-bred sheep, owned by Herr Adolf Heinrich Steiger, Lentewitz, Meissen, Saxony, was represented by eight fine animals. It has been bred for more than thirty years, without any admixture of blood, with reference to fineness, elasticity, and evenness of fiber. The original stock was imported from Spain by Prince Reuss in the beginning of the present century. The rams shear 12 to 14 pounds; the ewes, 5 to 6 pounds.

An Electoral flock numbering 800, owned by Herr Wilhelm von Fontaine, Upper Silesia, was represented by animals of large size, bearing

fleeces of fine cloth-wool weighing 8 pounds. Another large flock of Electorals, modified by Negretti blood, which has been in course of improvement for forty years with reference to perfection in evenness and fineness, was represented in the entry of Herr Freiherr von der Kettenburg, who keeps 1,600 in Schwetzin and 600 in Motgendorf. The clip of ewes averages from 4 to 5 pounds. The Electoral flock of 1,200 of Count Edward Oppersdorf, of more recent origin, yields fleeces weighing 5 pounds.

Specimens of a flock of 700 Electorals, springing from the Lehman breeding-fold, were exhibited by Herr G. von Wiedbach, of Culm, Prussia, bearing fleeces averaging 5 pounds.

Negretti flocks of considerable note were represented in the entries of Herr Robert Lehman, of Nitsche, Alt-Boyen, Posen; Count Kwilecki, of Oporowo; and Count Michynski, Posen. The Lehman flock of 500 ewes took high honors at the English and French expositions, and evidently has not lost prestige. Its fleeces average 5½ pounds. It was founded forty years ago with stock selected from the finest Negretti flocks of Mecklenburg, Silesia, and Moravia, and has since been fortified with the best attainable strains of pure Negretti blood. The Kwilecki fleeces are still heavier, averaging 6 pounds.

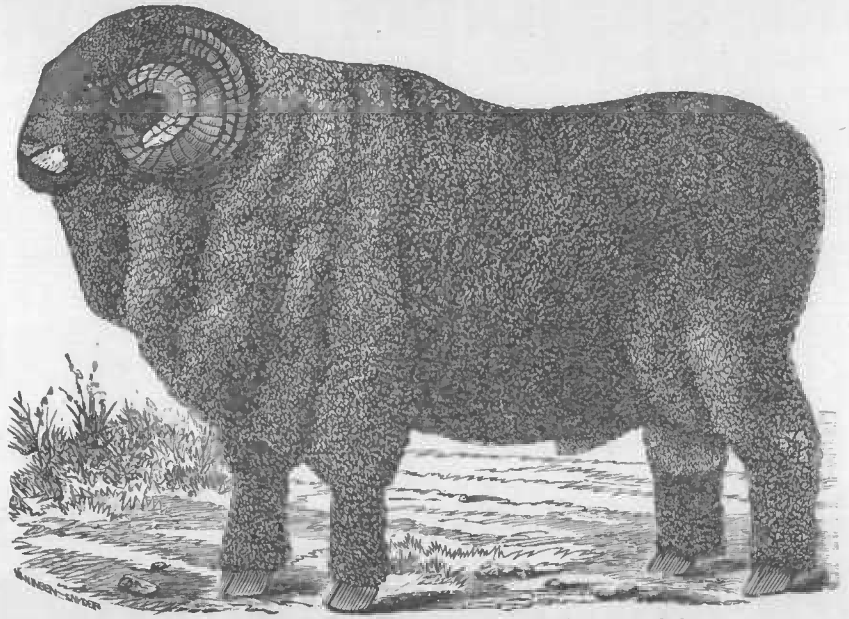
Among the breeders of Rambouillet Negrettis, Herman Kannenberg, Gerbin, Prussia, is prominent. This flock exhibited great evenness and elasticity of fleece, with fiber 2½ inches in length upon ewes and 3 inches upon the rams. Plate XVIII gives a good illustration of the style of this flock. The sire of this ram sheared 27 pounds of unwashed wool, which weighed 17 pounds after washing in hot water. The average weight of fleeces of the full-grown animals of this flock of 600 is 6½ pounds.

A fine flock of 600 Southdowns from the best English stock was represented in the entry of Baron Freiherr von Magnus, of Dresha, Saxony. Herr F. Neide, of Seschwitz, exhibited some specimens of a new breeding-fold of 400; and Herr George von Schoenermark presented selections from his flock, derived from Lord Walsingham's celebrated Merton Southdown stock. Herr G. Stahlschmidt, of Canena, near Halle, Prussia, also exhibited representatives of a flock for fattening purposes, derived from the English stock of Lord Walsingham, Sir W. Throckmorton, and Messrs. Jonas and Henry Webb. Weight of fleeces, 8 to 10 pounds.

A flock of Oxfordshire Downs was shown by Herr Ernst Botcher, of Gross-Lafferde, Hanover, with fleeces averaging from 7 to 8 pounds. This breed was also exhibited by Herr A. W. Brauer, Skludzewo, West Prussia, who presented specimens of an Oxfordshire-Merino cross, with white legs and faces, and bodies much larger than their fine-wool progenitors, and a fleece intermediate in its characteristics. Herr A. W. Schon, of Brestau, Prussia, entered specimens of his flock, originated with the design of furnishing full-bred Shropshires, for obtaining cross-breeds for fattening purposes. As might naturally be expected, flocks of comparatively recent origin, with unaccustomed management, feed, and climate, did not quite equal the appearance of the show-animals of Great Britain, which have represented the pride and glory of sheep-breeding of the fast-anchored isle. In this fact there is no proof of the necessity of deterioration in the removal of mutton-sheep to German pastures.

Among the native races were specimens of a small, active sheep, with horns and short tails, black faces, long wool of a brown color and heavy fiber, with a subcoat of fine down, exhibited by Herr H. Sprengel, of Schillerslage, Burgdorf, Hanover. They were catalogued as silver-gray

PLATE XVIII.



KANNENBERG'S RAMBOUILLET-NEGRETTI RAM OF 1873.

heath-sheep, (Haideschnucke,) from Luneberg-Common, on the north-eastern section of Hanover, south of the Elbe, and are easily kept and quite useful in cropping the scant herbage of those wild areas which are now being gradually brought under subjection of the plow. They may be considered a German counterpart of the Black-faces of the hill districts of England and Scotland. Perhaps the most appropriately-named natives, or original sheep of the country, are those exhibited by Herr Philip Volcker, of Annweiler, Pfalz, Bavaria. They were characterized by a good degree of symmetry, a fleece of medium quality, white horns, white legs, and black faces.

13. AUSTRIA.—The Austrian section of the exhibition was first in point of numbers, and represented some of the largest flocks of Europe, mostly Merinoes. That of Herr Karl Ritter von Baratta, of Budischau, Moravia, numbers 3,000 head, bearing a fine, even, silky fleece, that of ewes weighing 2½ to 3 pounds. A fine flock of about 600 Silesian Merinoes owned by Count Franz von Bellegarde, and founded by Baron Torkheim, of Moravia, produces wool of Electoral grade, averaging 3 pounds per fleece. Herr Herzog von Coburg-Gotha exhibited specimens of his flock of 1,800 in Walterskirchen, and one of 1,600 in Durnkrut, Lower Austria. The flock of 1,200 pure bloods of Prince Liechtenstein, Feldsburg, Lower Austria, is a very old one and very useful in furnishing rams for the improvement of flocks of that portion of the empire. Count Thun-Hohenstein, of Peruc, Bohemia, from his highly improved flock of 1,800, exhibited specimens bearing average fleeces of 4 pounds of wool of super-electa and electa quality, such as obtained premiums at the London and Paris Expositions. Baron Albert Freiherr von Klein, of Hennersdorf, Austrian Silesia, president of the Keltschan Sugar Company, showed his superior flock of Electorals, which has been bred pure since the first importation from Spain, 1770, up to 1865, at which date two rams from the Oschatz breeding-fold gave greater compactness and solidity to the body.

A fine flock of 800 combing-wool Merinoes was represented by the entry of Prince Schaumberg-Lippe, Ratiboritz, Bohemia. These fleeces are very heavy, averaging 14 pounds of wool, which loses 58 per cent. in washing, and the fiber is of unusual length in Merino fleeces.

A very noted Moravian flock of 3,000, that of Josef Maria and Emma Aresin, of Partschendorf and Erbredlnitz, Stauding, Moravia, was represented by 12 fine specimens of original Negrettis. The fleece must be deemed heavy, as the average of both sheep and lambs together is 3½ pounds after washing in warm water, of so fine a quality as to command an equivalent of a dollar per pound. They are in high favor among sheep-breeders of the Prussian states, Poland, Russia, Australia, and South America.

Several entries by Prince Schwarzenberg and his son, of Bohemia, represented two Negretti breeding-flocks of 1,000 each, in the domains of Frauenberg and Postelberg, which are used to improve the sheep of their estates in Bohemia and Hungary, numbering 25,000 or more, scattered over a territory of half a million acres. The writer had the pleasure of seeing the home-flocks at Wittingau in Bohemia, during the progress of the exhibition. The object sought in breeding is a fine, strong, marketable wool, and it has been obtained so fully as to secure first-class awards at national and other exhibitions, and satisfactory prices in the market.

A flock of 2,500 Electoral-Negrettis, bearing a fine elastic wool of comparatively heavy weight, the fleeces of ewes weighing 4 to 5 pounds and those of rams 7 to 8, was exhibited by Count Wallis, of Kollescho-

witz, Bohemia. Some of the best rams of this flock were offered at 600 florins, or $300, each. A very good Negretti flock, owned by Count August Fries, Czernahora, Moravia, was represented by ewes offered for sale at 100 to 200 florins, and rams at 500 to 600 florins. Another Negretti flock of 3,500, bred for abundant wool of much fineness and elasticity, was exhibited by Count Heinrich Daun, of Skalitz, Moravia An entry by Count Monnich-Larisch represented an Electoral-Negretti flock of 12,500, established half a century ago at Freystadt, Austrian Silesia. Several other flocks of considerable celebrity were represented at the show very similar in character to those above mentioned. The Negretti appears to be the favorite Merino family among Austrian wool-growers.

14. The Merino element is so prominent in Austria that the growing necessity for better mutton is beginning to be met rather by cross-breeds than mutton-sheep of full blood. The Cotswold-Merinoes on exhibition commanded much attention. They are without horns, have the white faces of Cotswolds and the pink noses of Merinoes. They are of good size, with a girth of nearly 6 feet over the wool. The fleeces at eleven months showed fiber 4½ inches long, much longer than the Rambouillet, finer than that of the Cotswold, with much of its luster, and a fair degree of the curl of the Merino, without its dirt and grease.

The union of Cotswold and Merino blood in the Keltschan Sugar Company's estate in Moravia has been more satisfactory in its results than any contemporary experience in cross-breeding. The change was effected by the use of imported Cotswold rams. The large area occupied, exceeding 6,000 acres, is hilly, and the pastures are covered with fruit-trees, suggesting sheep as the stock most appropriate to be kept. The old flock of fine wools was not profitable, the culls being almost worthless for mutton, upon which the rich beet-pulp was practically thrown away in an attempt to fatten them. The experiment was successful above expectation; the cross-breeds were thrifty, early attaining maturity, becoming fat at ten or twelve months old. After weaning, the lambs are fed with beet-pulp, hay, a little rape-seed cake, and oats, until a supply of mown clover is attainable, and later are pushed forward with mangolds. With such a course of feeding they weigh 140 pounds or more at twelve to fourteen months, and have brought at market an equivalent of 7 cents per pound live weight, or $10 per head. After the first cross, it has been found best to breed in-and-in by selection from the same flock. A second flock was constituted with reference to very large size and great hardiness, by selecting large native ewes from the Carpathian Mountains, (Zackels,) and also Merinoes of unusual size and coupling with rams of any breed having requisite size and constitution. The offspring of these selected sheep were paired with Cotswold males from England, and their progeny in-bred without further crossing. The result is the Keltschan sheep exhibited by the sugar-company, a large animal, an average wether weighing fully 170 pounds at fourteen months and 225 at eighteen. This company also has a Southdown flock, and a cross-bred or a Southdown-Merino flock, the latter well adapted to medium lands, but surpassed by the Cotswold-Merinoes for rich lands, and by the heavy Keltschan sheep for profit as pulp-eaters and flesh-makers. The weight of fleeces of the Cotswold cross is fully 4 pounds, and of the others 3 pounds.

The Archduke Albrecht of Teschen, Austrian Silesia, exhibited samples of his pure Southdowns, and of his flock of 250 Southdown-Merinoes, and 650 Southdown-Birki half-breeds. The fleece is middle fine and salable.

An exhibition of improved Zackels made by Baron Jacob Ramaszkan, Galicia, justly attracted much attention. They produce fleeces weighing from 6 to 18 pounds of wool of better quality than the ordinary samples of this breed, and command a rental of $1.50 or more per head for their milk during the season.

15. HUNGARY. The Hungarian section comprised the largest number of animals, mostly Merinoes of Negretti or Electoral blood, though there was a single entry of pure Rambouillets. The English breeds were absent, except as amalgamated with the Transylvanian Zackel, of which cross there were representations from the flocks of Baron Banffy, of Klausenburg, and Count Emerich Miko, of the same locality, and also of those of Joseph Zeyk and Ladislaus Tisza. This cross, having the same base on one side as in the successful Keltschan amalgamation, proves to be a positive acquisition. The wool is greatly improved, being longer, finer, more lustrous, and the fleece is of far greater weight, and the flesh loses its strong flavor and is laid on with much greater rapidity. As milkers, a point for which the original Zackels are distinguished, they lose something by the Lincoln cross.

The Zackels are in many respects a valuable race. They are large, hardy enough to endure Hungarian winters without shelter, and yield an income annually of about $3 per head, derived in about equal proportions from wool, lambs, and milk, the latter producing about 15 pounds of cheese. There are black sheep and white in every flock, and in many flocks the black are preferred, the skin of their lambs being more valuable, though the wool of white sheep commands a higher price. The leg is short, and, for so large an animal, it is moderately fine-boned; and the wool is long and coarse, usually bringing an equivalent of 11 to 12 cents per pound.

Among other natives exhibited were Wallachian sheep of a migratory habit, living on the plains in winter and in the mountains in summer. They are large, of a reddish-brown color, hornless, and long-legged. Their owners go with them, and, accompanied by their families, live in the open air during the warm season and dwell in comfortable houses of wood as their winter-quarters.

The Merinoes exhibited were numerous, representing many and large flocks, one of them consisting of 25,000, and several were distinguished by wool of great fineness. They are bred for wool with very little regard to flesh. Evidently there is a tendency to change in this respect, in the direction of increase of weight and value of the fleece.

16. RUSSIA. There was but a single entry of three Merinoes from Russia.

CHAPTER II.

RECENT IMPROVEMENTS AND PRESENT STATUS OF SHEEP-HUSBANDRY.

CAUSES OF DEVELOPMENT OF EUROPEAN BREEDS. GREAT BRITAIN: PROGRESS OF WOOL MANUFACTURES AND COMMERCE; OF SHEEP-CULTURE; CLASSIFICATION OF BRITISH BREEDS; LEICESTER SHEEP; BORDER-LEICESTERS; COTSWOLDS; LINCOLNS; ROMNEY-MARSH SHEEP; SOUTHDOWNS; SHROPSHIRE DOWNS; HAMPSHIRE AND OXFORD DOWNS; EXMOOR SHEEP; DORSETS; WELSH MOUNTAIN-SHEEP; CHEVIOTS; BLACK-FACED SHEEP; ROSCOMMON SHEEP. FRANCE: STATISTICS; DISTRIBUTION OF BREEDS; CROSS-BREEDING; RAMBOUILLET STOCK; BREEDING-ESTABLISHMENTS; FRENCH METHODS. AUSTRIA-HUNGARY: STATISTICS; METHODS. GERMANY: INTRODUCTION OF THE SPANISH RACE; STATISTICS; SAXON, PRUSSIAN, SILESIAN, AND BAVARIAN SHEEP-CULTURE. RUSSIA: STATISTICS AND BREEDS.

17. There are few of the races of sheep extant in Europe a century ago that have not felt the modifying effect of recent progress in manufactures. The extension and gradual perfecting of woolen machinery

made a demand at first for wool of finer quality, which was met by the dispersion and propagation of the Spanish fine-wool sheep, and by the amelioration of longer and coarser native wools through cross-breeding with the Merino type. By such means fibers too fine and valuable for carpets and coarse cloths, and too long for card-wool machinery, became abundant, in quantity far exceeding that yielded by fine-wool sheep of pure blood. This stimulated invention in the direction of fancy worsteds and combing-wool fabrics of all kinds.

Again, increasing population in the most opulent districts demanded more and better meat-supplies; and breeding, with reference to enlargement and improvement of carcass and to rapid fattening by greater consumption of feeding material, gave greater weight and length of fleece, requiring the aid of invention and effort to utilize such wools and popularize the fabrics made from them. In this way has arisen to public prominence a long line of coarse but strong and serviceable goods, which in their turn command the favor of fashion, and often hold well their popular position. A portion of these mutton-breeds, and especially the lambs, possess a singular glossiness of fiber, a silkiness and tenacity that render them peculiarly suitable for lustrous fabrics of ladies' wear; and these have encouraged the extension of so-called lama and alpaca goods, and all sorts of gauzy and glossy stuffs so irresistible to feminine humanity in shopping excursions.

Such causes have operated and co-operated to produce the present styles of goods made of wool, and to shape the frame and covering of the animal that yields it. They account fully for the changes in the modes of manufacture, the modification of the ovine breeds, and even the vagaries of fashion, in clothing-fabrics; for, despotic as is the sway of fashion, it is itself full often the creature of inevitable necessity—the mother of invention, both of modes and machines.

Observation of the various breeds exhibited at the international show of 1873 at Vienna, and inspection of European wools at the exhibition, render more vivid the impression of universal modification and general improvement, for the best practical results, which the student of agriculture receives from the current record of progress in rural economy of the Old World. A brief reference to the prominent breeds of European sheep, with a glance at their history, will further illustrate the practical aspects of this subject, and may possibly prove the most utilitarian method of treatment of this report. First among the nations for radical and profitable results of improvement of sheep stands—

18. GREAT BRITAIN.—The first year of the present century found British manufactures of wool depending for their meager foreign supplies upon Spain and Portugal. Of the 8,609,368 pounds imported during that year, those countries sent, respectively, 6,062,824 and 1,731,934 pounds. Germany contributed 412,394 pounds, and the Netherlands 141,739 pounds. The remaining contributions were fragmentary and of small importance. The aggregate quantity imported annually has now reached 361,133,165 pounds—more than forty times the receipts of seventy-five years ago.

A glance at the manufactured goods reveals the remarkable change in modes of manufacture and style of fabric. In 1820 the value of exports of wools and manufactures of wool was £5,989,622. The largest item was cloths, £2,477,643, with smaller amounts for coatings and kerseymeres; while there were of woolen and worsted stuffs, £1,782,835; £282,860 for flannels; £185,956 for blankets, and £117,073 for carpets. These were not only the days of small things, but the worsteds, all sorts of combing-wool fabrics, and carpets, were items particularly small.

Fifty-two years later these exports reached the sum of £32,383,273, of which worsted stuffs were valued at £20,905,163, and cloths, formerly constituting the bulk of the exportation, only £6,991,718. These facts, together with the ever present necessity of enlarged meat-supplies, furnish the key to the changes which have taken place in British sheep-husbandry.

19. This change is briefly indicated. As the short-horn type has as a model given direction even to the improvement of other breeds of British cattle, so has the ruling idea in that improvement dominated in the modification of the original breeds of sheep, as illustrated in the creation of the present Leicester type, and in a less degree in the changes in all the other breeds. More meat, of a better quality, in a shorter time, has been the maxim of British sheep-breeders.

The official returns of Great Britain show that the farm-areas there carry an unparalleled amount of live stock. The latest figures for England, for 1874, represent an area of 32,597,398 acres, of which only 24,008,368 are in crops of all sorts, grass, and bare fallow, carrying 19,859,758 sheep, besides 4,305,540 cattle, 1,007,398 horses, and other live stock.

Lincoln County, with 1,629,011 sheep, has 237,621 acres in green crops, 164,047 in grasses and clover in rotation, and 416,869 in permanent pasture. Here is about the same area in roots and hay as in pasture, and twice as many sheep as total acres, with 212,800 cattle and some other stock.

The returns from Scotland covered 19,496,132 acres, of which only 4,579,821 are utilized in grass and other crops, and yet the sheep number 7,389,487. In one county, Argyle, there are 1,061,873, and only 87,568 acres in pasture and forage, divided into 12,095 acres of green crops, 18,946 of grasses in rotation, and only 56,527 in permanent pasture. Were mountain-lands included, there are more than half as many sheep as acres returned.

20. The British breeds are most naturally divided according to altitudes and fertility of their habitat. The large breeds, white, hornless, and bearing long wool with small felting property, occupy the rich alluvial districts, the lands reclaimed from the sea, and the highly cultivated and very productive farm-areas. These are the Leicester, Lincoln, Romney-Marsh, Cotswold, the few remaining of the Devonshire Notts, the Roscommon, and similar Irish sheep. Next should be classed the sheep of the chalk-downs, the commons, and forests, suited to a dry and temperate climate. There are the Downs of several families, perhaps now to be taken as breeds, the Dorsets and their congeners, the pink-nosed Somersets. They produce a short felting-wool, suited to inferior grades of goods. The Ryeland, formerly found in the western counties, and esteemed for producing the finest cloth-wool of England, is now almost extinct. The third general division comprises the mountain breeds, first the Cheviots of the hills of the North of England and borders of Scotland; the Black-face of the central chain of mountains and moors northward from Derbyshire to the mountains of Scotland; and two varieties of Welsh mountain-sheep, and the Kerry and other mountain-breeds of Ireland. There are many local remnants of the ancient stock allied to the above, but there are none worthy of special mention.

The weight of fleece of British sheep averages about 5 pounds. The Lincolns may be placed at 8 pounds, the Cotswolds nearly the same, the Leicesters at 7, the Downs at 4, the Cheviots at 3, the Black-faces at 2½, and the Welsh at 2. The Leicesters are most numerous, exceed-

ing one-third of all; the Downs one-sixth, the Black-faces nearly as many, Cheviots one-eighth, leaving about one-fifth for other breeds. The heavy breeds of eighty years ago, modified mainly by the Leicester, now furnish lighter fleeces. For instance, the Lincoln, as reported by Hon. Robert R. Livingston, then yielded 11 pounds; the Teeswater and Cotswold, 9 pounds. These are, of course, average weights, as rams as well as pampered ewes and wethers, greatly exceed the average. The weight of carcass exceeds by 20 per cent. the weight of imported mutton, and averages 60 pounds; by some estimates, 65 pounds. A brief reference to this improvement, with the characteristic points and present status of the principal breeds, will indicate more fully the progress of the century in sheep-husbandry.

21: *Leicesters.*—The Leicestershire sheep, in the beginning of the Bakewell era of improvement, were known by their names, the old Leicesters, the new Leicesters, or Dishleys, (the latter from Bakewell's place of residence,) and the forest-sheep. The Dishley experiment commenced in 1755, and was continued so successfully that the rams of their famous flock ultimately commanded $15,000 as hire for the season, giving an impetus to the improvement which was perpetuated by the permanence and desirability of the results achieved, until the breed assumed a position which has been maintained to the present time.

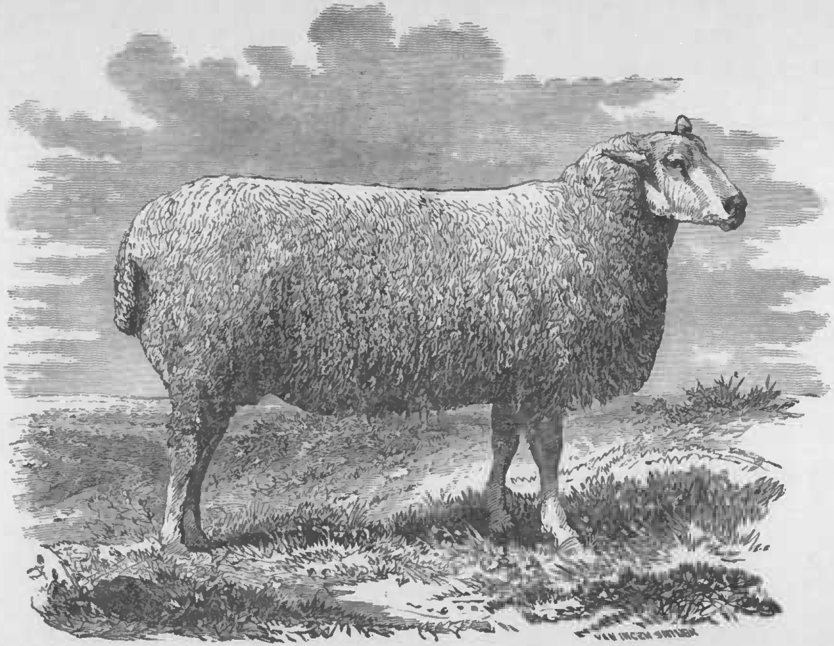
The original Leicester upon which Bakewell commenced his experiment was an animal of large frame, with heavy bone and coarse-grained meat, a flat-sided carcass, and legs large and rough. It was a slow feeder and necessarily late in reaching maturity, weighing at two or three years old 100 to 120 pounds. Seeing the necessity of obtaining, in addition to the fleece, the largest possible increase of flesh in proportion to the food consumed, in the shortest period of time, he bred by selection most persistently and skillfully for these objects. With these aims always in view, he chose with rare judgment, yet with a broad latitude as to breed or family, such animals as would approximate his ideal of compactness and symmetry, refinement of bone, a reduction of the proportion of unprofitable parts, and higher capacity for rapid conversion of food to flesh. After securing this result by animals of characteristics so widely differing from those of the original stock, he found necessary a rigid adhesion to the practice of in-and-in breeding to keep the advantage gained, until a fixedness of type had been secured which should impress itself surely and indelibly upon any race which might be selected for improvement.

In accomplishing results of such practical value, with all possible care to retain the sound constitution and great hardiness of the old stock, there was perhaps inevitably induced a comparative delicacy, a reduction in size, a decrease in prolificacy and excellence as nurses. These defects have demanded the wisest judgment in the infusion of fresh strains of blood, by which the stamina of the race has been fortified, and its popularity maintained until the present day, to such a degree that the Leicester blood is far more widely diffused than that of any other breed, even modifying essentally all the long-wool races, and to some extent the mountain-breeds, and some families of the short-wool Downs.

22. The true type of this breed, as understood by Youatt, is thus described:

The head should be hornless, long, small, tapering toward the muzzle, and projecting horizontally forward. The eyes prominent, but with a quiet expression. The ears thin, rather long, and directed backward. The neck full and broad at its base, where it proceeds from the chest, so that there is, with the slightest possible elevation, one

PLATE XIX



BORDER LEICESTER RAM

continued horizontal line from the rump to the poll. The breast broad and round, and no uneven or angular formation where the shoulders join either neck or the back; particularly no rising of the withers or hollow behind the situation of these bones. The arm fleshy through its whole extent, and even down to the knee. The bones of the leg small, standing wide apart; no looseness of skin about them, and comparatively bare of wool. The chest and barrel at once deep and round, the ribs forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The barrel ribbed well home; no irregularity of line on the back or belly, but on the sides; the carcass very gradually diminishing in width toward the rump. The quarters long and full, and, as with the fore legs, the muscles extending down to the hock; the thighs also wide and full. The legs of a moderate length; the pelt also moderately thin, but soft and elastic, and covered with a good quantity of white wool.

The Leicester requires less food in proportion to weight than any other race. They are mostly sold early in the summer or early autumn after their first year, many wethers at twelve to fifteen months weighing 20 to 25 pounds per quarter; and at two years they attain the weight of 30 to 37 pounds. The fleeces are valuable as fine combing-wool, and, if well grown, weigh from 7 to 8 pounds each.

23. The earliest record of this breed in the United States is a mention by Custis of the Bakewell ewes on the estate of Washington, from which, through a cross by a Persian ram, was derived the somewhat famous Arlington long-wooled sheep. The influence of this and other long-wool flocks of Virginia gave a popularity to the English races which has continued to the present day, though the preference at present appears to be given to the Merinoes, especially since the war and its accompanying destitution and lack of thrift. Kentucky also gives a preference to the Leicester, as a fit companion to the short-horn bullock upon the blue-grass pastures. They are to be found in small numbers in the Middle and Ohio Valley States, generally in a semi-degenerate state, not bred up to the modern standard of the perfect Leicester in his English home. Mr. Samuel Campbell, of New York Mills, N. Y., has imported several first-class specimens, and a few years since had a two-year-old that weighed 300 pounds.

The mutton of Leicesters is too fat to suit American taste, yet that of grades is quite palatable, though coarse-grained, with too much outside fat. Even in England meat of animals two years old is less valuable than that of lambs or shearlings; and the price is always materially lower than mutton of Southdowns and the mountain-races.

24. *Border-Leicesters.*—More than a century ago some of the sheep-folds of the border were re-enforced by Leicestershire sheep of established repute. Early in the present century representatives of the Dishley stud began a contribution to the improvement, which has been continued until they have won a distinct position in the show-yard and in popular esteem. The characteristics of this breed, as given by Mr. John Wilson, are extraordinary aptitude to fatten and early maturity. He says:

The most marked feature in their structure is the smallness of their heads and of their bones generally, as contrasted with their weight of carcass. They are clean in the jaws, with a full eye, thin ears, and placid countenance. Their backs are straight, broad, and flat; the ribs arched, the belly carried very light, so that they present nearly as straight a line below as above; the chest is wide, the skin very mellow, and covered with a beautiful fleece of long, soft wool, which weighs, on the average, from six to seven pounds. On good soils, and under careful treatment, these sheep are currently brought to weigh from eighteen to twenty pounds a quarter at fourteen months old, at which age they are now generally slaughtered. At this age their flesh is tender and juicy, but when carried on until they are older and heavier, fat accumulates so unduly in proportion to the lean meat as to detract from its palatableness and market-value.

25. The ram represented in the accompanying engraving, (Pl. XIX, which is produced from a photograph received from the Agricultural

Gazette, of London)* is from the Mertoun flock of Lord Polworth, in Berwickshire. This flock contains unsurpassed specimens of this breed. Two ewes once exhibited at the Highland show measured 4 feet 9 inches in girth; and a shearling (which means yearling) ram at the same show measured 5 feet 1 inch, and 45 inches in length from the back of the head to the tail. This flock was established by Mr. Scott, grandfather of Lord Polworth, and has been steadily progressing in excellence. The engraving does not indicate a pampered sheep, intended only for the show-yard; but the straight and broad back, the wide chest brought well forward, the well-sprung ribs and long quarters, the full and square rump, all bespeak an animal compact and symmetrical—a meat-maker of the highest order.

26. *Cotswolds.*—This is one of the largest English breeds, though the improved race is smaller than the originals, on account of the influence of the Leicester element in its amelioration. As a breed it is of great antiquity. It has gained in fleece and form, and comes to maturity earlier; is more prolific than the Leicester, and has greater strength of constitution; is often fattened at fourteen months, yielding fifteen to twenty pounds per quarter, and twenty to thirty if kept till two years old. The fleece is 6 to 8 inches in length, and sometimes much longer; is strong, somewhat coarse, of good color, and yields a heavy fleece. The mutton is superior to that of the Leicester, with a smaller proportion of fat, and the sheep are also superior to that popular breed in weight of wool, size, hardiness, and vitality. They are possessed of good figure, have a large head, well set on, a broad chest, a well-rounded barrel, and a straight back. They are often used for crossing upon other breeds, and for obtaining earlier market-lambs, both in this country and in Europe. They are more widely disseminated in this country than any other long-wool, and preserve well the popularity which they have attained here. Some imported sheep of this breed have borne fleeces in this country of eighteen pounds.

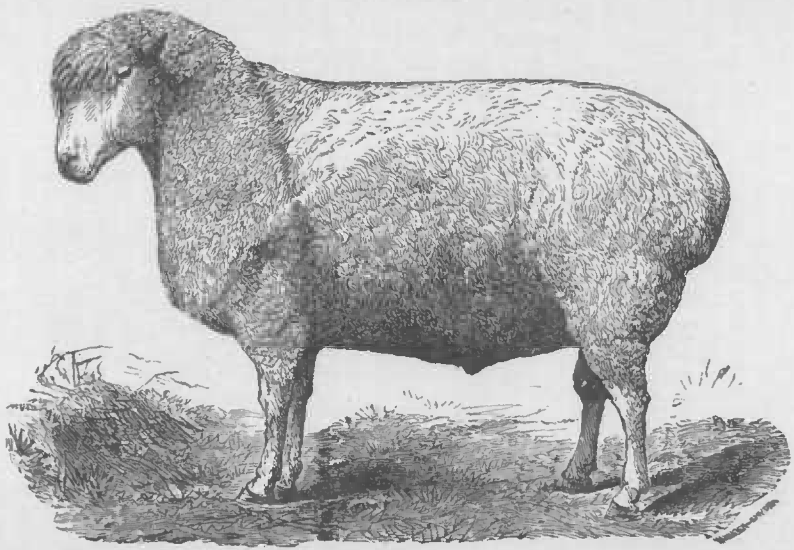
27. *Lincolns.*—The old Lincolns, of the fertile meadows of Lower Lincolnshire, were remarkable beyond any contemporary breed for coarse and heavy forms and length of wool, the fleeces weighing ten to twelve pounds. They were hornless, with large limbs, hollow flanks, and flat sides. They shared with the Romney-Marsh sheep the alluvial and fen districts, consumed largely their rank pasturage, and fattened slowly. When the fame of Bakewell at Dishley was rising to its zenith, recourse was had to his improved Leicesters for improvement in the flesh-taking property, and this course of crossing was pursued to the close of the eighteenth century, and indeed to the present time, as found necessary, for the purpose of securing a better form and earlier maturity without losing wholly their peculiarities of size and length of fiber.

For at least a quarter of a century a sharp contest was waged between the supporters of the old and the new, the former fearing the loss of hardiness and local adaptation, as well as its unrivaled peculiarities of fleece, while the latter were quite willing to risk any or all of these results in the belief that more mutton and wool and money could be realized upon each acre of area than with the modified Lincolns. And the latter ultimately prevailed, and verified the correctness of their theory.

The effect of this change upon the wool has been to make it shorter and finer, and to diminish somewhat its softness of fiber. It is a question whether the peculiar quality of the wool could have been retained in larger degree without essential injury to its meat-producing quality.

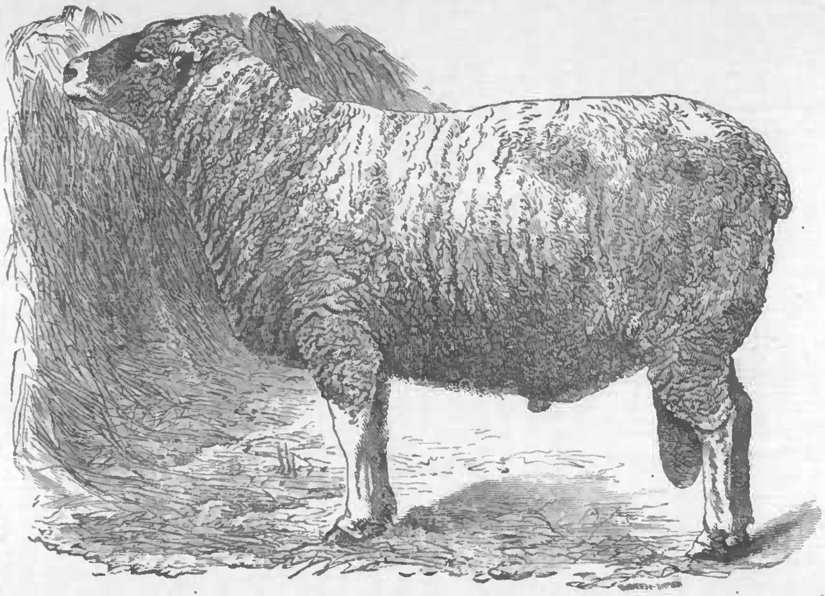
* To the same source should be credited photographs of the other engravings of English sheep.

PLATE XX



COTSWOLD RAM OF THE CIRENCESTER AGRICULTURAL COLLEGE.

PLATE XXI.



SOUTHDOWN RAM.

This district still produces the largest sheep of Great Britain, with fleeces superior in weight and value to any other. They are not equal in earliness of maturity to the Leicesters, but they are profitable, and suitable to the rich lands they occupy, wethers frequently attaining the enormous weight of fifty to sixty pounds per quarter.

28. *Romney-Marsh.*—There is another breed of English sheep inhabiting the rich alluvial soil of Kent known as the Romney-Marsh sheep, which pertinaciously retains its distinctive features, though modified and improved by recent breeding. It is a large sheep, not very symmetrical in form, having narrow fore quarters and flat sides, and coarse bone and muscle. It has a white face, a long and thick head, and a tuft of wool on the forehead. The wool is of more value than the mutton, perhaps, (but would not be profitable without it,) being long, fine, and lustrous, and in demand at good prices for export to Flanders and to France, for the manufacture of "cloth of gold" and similar fabrics. Other breeds have been introduced upon the marshes, but cannot maintain themselves in competition with the Romneys. The country is flat, open to the east, and very bleak, yet these sheep live through the winter in the open fields, and have little protection or supplied food. The ewes are comparatively prolific, about 30 per cent. of doubles being expected in reproduction. The lambs come late after the severity of the winter is over. With a good course of turnip-feeding after the first wintering they can be brought to seventeen pounds, sometimes to eighteen pounds, per quarter, yet they are more frequently kept over a second winter. They are not very early in maturing, and grass is the main reliance for growth if not for fattening. There are cattle on the farms, but sheep greatly predominate and furnish the principal profits.

The pasture-lands of the marsh differ greatly in productiveness. There are "feeding-lands," keeping two or three ewes in winter and twice as many in summer; and the "fattening-lands" keep four or five sheep per acre. The hardiness of this breed and its adaptation to the locality is indicated in the following from the London Field:

> We remember passing through a portion of the marsh during winter, and being struck with two things—the exceeding greenness of the grass, and the number of big, robust-looking ewes, which rather crowded than dotted the plain. A keen east wind penetrated our bones, despite our Ulster, yet the sheep minded it not a bit; and we learned, to our great surprise, that, save in deep snow or prolonged frost, they fended for themselves, and then only got a mouthful of hay. No wonder that they held their own; they were on their native ground, and not to be disturbed. There are still large graziers who object to using hay, even when the ground is covered with snow, preferring the sheep to scratch down to the grass. In former times it was but too common for the ewes to be left entirely unprotected during the lambing-season, and great were the losses in times of severe frost. Now the ewes are placed in a sheltered inclosure near the homestead, or a temporary ewe-pen is erected wherein the ewes lie at nights, supplied with hay and a few turnips, if they can be spared, and where the lamb is sheltered for the first few days of its existence, care being taken not to render it delicate by too much protection.

29. *Southdowns.*—The original Sussex or Southdowns have probably the purest blood, free from admixture during the long period which covers the rise and development of the British wool-manufacture and the increase of meat-production, of any race of British sheep. Their improvement has been long-continued and is still continuing, apparently without the necessity of recurrence to any foreign blood for amelioration of a single objectionable point. While they have been greatly improved, progress has invariably been in the direction indicated in the distant past, and not by radical and violent changes. It has been carried on, there is little reason to doubt, solely by selection, there being little, if any, positive evidence that the Leicester or other blood has aided in the

amelioration. In the production of Hampshire and Shropshire and other breeds bearing the Down name, it is well known that other blood has been effectively used; but it should be remembered that these families, or rather breeds, are not really improved Downs, but have come from selected individuals of other hardy primitive breeds, molded into a modification of the Southdown type by large and repeated infusion of that blood, with occasional dashes of Leicester to give greater size and aptitude for fattening. The changes effected in the true South (or Sussex) Downs have been mainly these: Speckled faces have been changed to a uniform tint of brown or fawn color, sometimes almost a gray; the forehead and cheeks have been partially covered with wool; a greater symmetry of form has been obtained; a larger size and greater fattening aptitude. The flock of Lord Walsingham exhibits some deviation from the Sussex type, having somewhat greater length and a decided development of the fore quarter, giving greater weight at the expense of somewhat reduced value to the butcher. They are splendid animals, and have been largely sought by continental purchasers, though disapproved by many breeders of pure Southdowns.

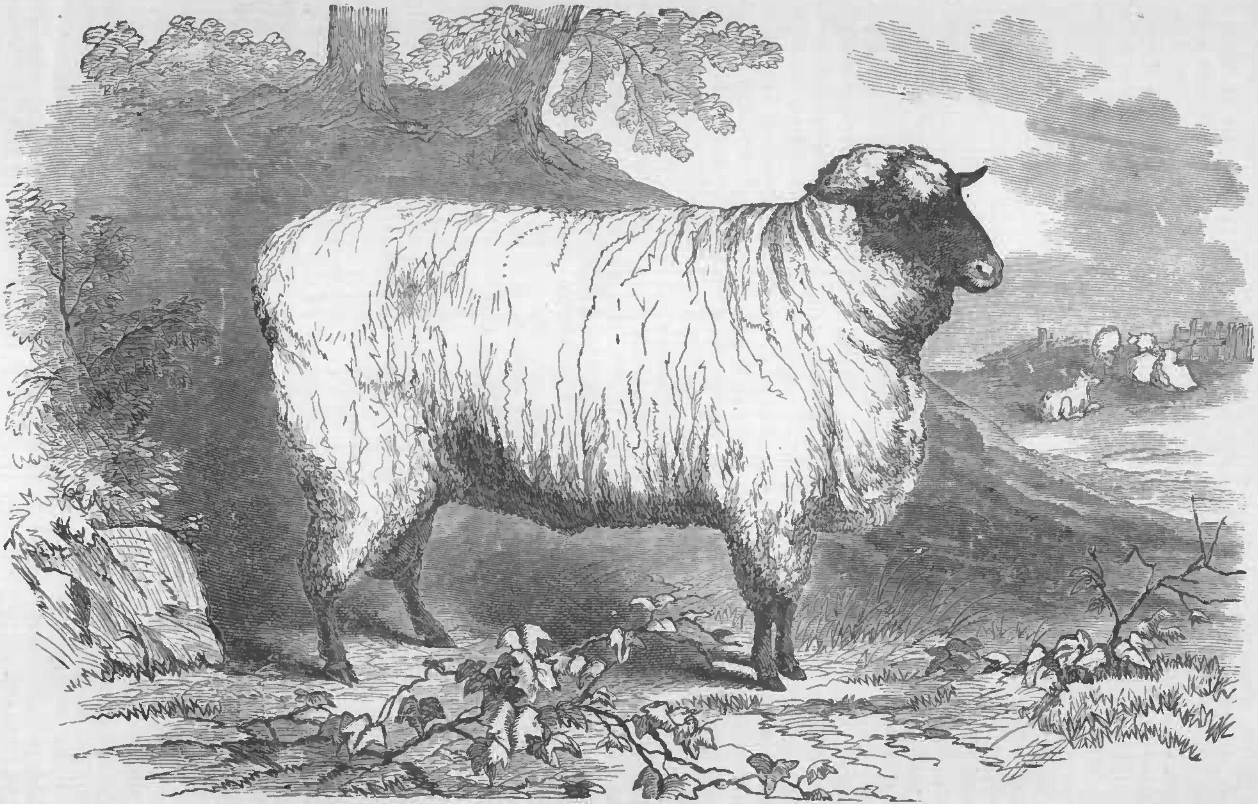
By reason of its purity the Southdown, perhaps, has stamped its peculiarities upon its cross-bred offspring more certainly and strongly than any other of the English breeds; and for this reason, together with its hardiness and the unsurpassed quality of its mutton, it is deemed of greater practical value in its crosses than in its pure-bred flocks. But for the fact that quantity and quickness in lamb-production are of more pecuniary value than superior quality, it would far surpass the Leicester in its prevalent use for cross-bred early lambs.

30. It is now about one hundred years since Mr. Ellman, of Glynde, Sussex, sought a more symmetrical and profitable form, and a superior flesh and fat producing habit, without injury to constitution or fecundity; and he pursued his object slowly, cautiously, with a judgment, patience, zeal, and intelligent liberality that insured success. The light fore quarters, narrow chests, and long necks and limbs, were totally changed. This is the description given by Mr. Ellman, himself, to his improved sheep:

> The head small and hornless; the face speckled or gray, and neither too long nor too short; the lips thin, and the space between the nose and the eyes narrow; the under jaw, or chap, fine and thin; the ears tolerably wide and well covered with wool, and the forehead also, and the whole space between the ears well protected by it as a defense against the fly; the eye full and bright, but not prominent; the neck of medium length, thin toward the head, but enlarging toward the shoulders, where it should be broad and high, and straight in its whole course above and below. The breast should be wide, deep, and projecting forward between the fore legs, indicating a good constitution, and a disposition to thrive. Corresponding with this, the shoulders should be on a level with the back, and not too wide above; they should bow outward from the top to the breast, indicating a springing rib beneath and leaving room for it, the ribs coming out horizontally from the spine, and extending far backward, and the last rib projecting more than the others; the back flat from the shoulders to the setting on of the tail; the loin broad and flat; the rump long and broad, and the tail set on high, and nearly on a level with the spine; the hips wide, and the space between them and the last rib on either side as narrow as possible, and the ribs, generally speaking, presenting a circular form like a barrel; the belly as straight as the back; the legs neither too long nor too short; the fore legs straight from the breast to the foot, not bending inward at the knee, and standing far apart both before and behind; the hocks having a direction rather outward, and the twist, or the meeting of the thighs behind, being particularly full; the bones fine, yet having no appearance of weakness, and of a speckled or dark color. The belly well defended with wool, and the wool coming down before and behind to the knee and to the hock; the wool short, close, curled, and fine, and free from spiry projecting fibers.

31. *Shropshires.*—Another branch of the Down family, in which amalgamation has brought valuable compensations for departure from

PLATE XXII.



HAMPSHIRE RAM.

the true Sussex type, is the Shropshire sheep. It is founded on the ancient Longmynds of Shropshire, and the occupants of Cannock Chase, in Straffordshire, heath-sheep, which were noticeable for unusual size and thrift, thus described by Plymley in 1803: "There is a breed of sheep on the Longmynd with horns and black faces that seem an indigenous sort; they are nimble, hardy, and weigh near 10 pounds per quarter when fatted. The fleeces upon the average may yield 2½ pounds, of which one-half pound will be the breechens, or coarse wool, and is sold distinct from the rest. The farmers of the hill-country seem to think the greatest advantage they derive from the access of foreign stock is from the cross of the Southdown with the Longmynd sheep; the produce they state to be as hardy and to bite as close as the Longmynd sheep, and the weight of the carcass is increased." These sheep were small of frame and light of fleece, compared with the Southdown. About this time the Southdown cross became quite popular. The same course of improvement has continued, directed toward an increase of size and development of feeding capacity. While it has proved successful, it has not been under the predominant control of one directing mind, and a slight want of unity in the work of the principal breeders has been manifest, tending to wider divergence under unskillful breeders. Some of the principal improvers, after employing the Southdown to straighten the spine of the coarse originals, and give them oblique shoulders and well-sprung ribs, found it necessary to infuse a Leicester strain to shorten the back and chine and give fattening aptitude; after which a course of close breeding was necessary to fix these characteristics. Others sought more slowly, and with comparatively doubtful result, to obtain similar or equally desirable qualities by selection alone.

The resultant lack of uniformity for a long time kept the Shropshires from being recognized as a distinct breed; yet the enterprise and intelligence which continued the improvement, by judicious selection from the best flock, succeeded in winning the recognition of the Royal Agricultural Society in 1860, since which date the entries at the great shows have been numerous, and the animals shown increasingly popular. Lord Chesham, who exhibited at Vienna, is one of the most successful of the present breeders of Shropshires.

This breed is now of larger size than the Southdown, with longer face of uniform dark tint, a full and spirited eye, spreading ears of good size, and a forehead rather flat and well wooled. They are very prolific, the ewes generally bringing doubles if well cared for, and, what is better still, the mothers are amply able to bring up the lambs in good condition. They excel the Southdown in yield both of mutton and wool. They scarcely attain the weight of the Hampshires, but reach maturity earlier, and have less bone and offal. Their fleece-weight is generally from 5 to 7 pounds. The meat is like the Southdowns in fineness of texture, the presence of fat in the tissues, and richness of color. At twelve or fifteen months they will sometimes reach 20 pounds per quarter. They bear close folding well, are found hardy in moist climates, and will endure a wide range of soils and feeding.

32. *Hampshires.*—This family of Downs, unlike the Sussex, is founded through skillful breeding. It was effected in harmony with the idea of more meat in a shorter period of time—the same which originated the Leicester and the Shorthorn—by admirers of the Southdown style, who saw in the size and the early maturity of the Wiltshire horned sheep and the Berkshire Nott, qualities forming an admirable foundation for a breed upon which the fine form and superior quality of flesh of the Down could be ingrafted. It is worthy of notice that a breed

which has long displaced the original Sussex Down and other breeds in Berkshire, Hants, Wilts, and Dorset, has been made what it is, in the hands of skillful breeders, by the blood of the finest specimens of the race which they now dominate in all this section. This change is a natural result of the inclosure of the commons, the introduction of artificial manures, and the production of such crops as turnips, rape, vetches, trifolium, rye, and Italian rye-grass. This is one of the facts with which the history of British sheep-husbandry teems, illustrating the necessity of change in breeds, with changed conditions of production or consumption. It is estimated that the weight, both of mutton and wool, has been increased in this region 50 per cent.

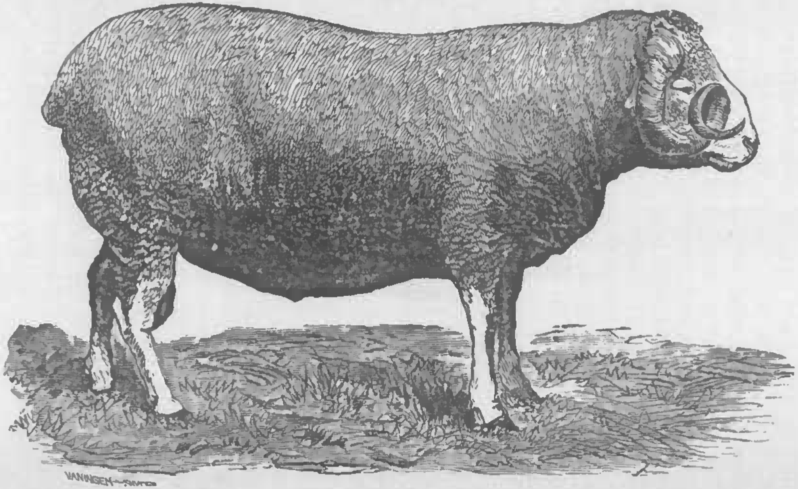
The statistics of 10,000 Hampshires for three successive years showed the average yield of lambs to be 91 per cent., the mortality of ewes 5½ per cent., and of tegs 3 per cent., per annum. The wool is of fine quality, but short staple, averaging 4½ pounds per fleece. The best specimens of these sheep may be found at the Overton and Weyhill fairs, in Hampshire, and the Britford and Wilton fairs, in Wiltshire. At the latter, February lambs realize 55*s.* to 72*s.* per head; the finest thus commanding an equivalent of about $18 in gold for butchering. The wether-lambs are now usually sold in the latter part of summer or early autumn, and the ewes are kept three years for breeding. The period of service of rams is from August 1 to the middle of September.

The ewes are usually kept on turnips and hay during the winter, the hay being cut into chaff with a portion of straw, and sometimes seasoned with a little malt-dust, bran or cake. The lambs go out on turnips, if the weather is fine, in a few days after they are dropped, though many farmers keep them penned for two or three weeks. After April 1 they leave their diet of turnips and hay, and go to the water-meadows by day, and are folded at night on Italian rye-grass, winter-barley, or trifolium, the wether-lambs getting a little cake or corn. On farms that have no water-meadows a larger supply of late swedes is secured, and the lambs are kept upon winter-growing grasses and forage-plants until the vetches are in bloom. Early in May they are weaned, when it is common to pasture in clover by day and fold on vetches by night. When the vetches are consumed, the sale lambs are supplied rape and cabbages and the ewe-lambs follow to consume what the wethers leave. Thus managed, the lambs attain great size and command high prices. Formerly they were largely sold, from July to September, to go to Kent and Surrey, and other points near London, to be fattened for the markets of that city. They are now so good that they are sold for immediate consumption. It is deemed proper to give somewhat in detail the mode of management in fat-lamb growing, not only to show the practice employed with this particular breed, but to call renewed attention to the necessity of high feeding in this business, and illustrate again the constant variation in feeding and management to meet the requirements of changed or differing circumstances.

33. *Oxford Downs.*—This breed is produced by a successful course of cross-breeding of Cotswolds with Hampshire ewes, a dash of Southdown blood being used occasionally to perfect the cross. It is an animal characterized by great hardiness of constitution, good size, heavy fleece, facility of fattening, and excellent mutton. It yields a desirable quality of thick and heavy wool, weighing about 7 pounds per fleece. Mr. Spooner has called it the most successful attempt at cross-breeding ever made in England. It has been claimed by some to be the best rent-paying breed in the country.

34. *Exmoor Sheep.*—In the mountainous section of Somerset are found

PLATE XXIII



DORSET RAM

the Exmoor sheep, a horned breed, so hardy that a few days' burial in a snow-drift is said to be not too severe a test of their endurance. They have long been remarked for their drum-like roundness of form, though they are becoming square under the recent efforts of breeders. They are larger and in all respects better than the Welsh mountain-sheep, good feeding bringing them up to 18 and 20 pounds per quarter, and in some cases to 24 pounds. At 18 months they can be made to weigh 15 to 20 pounds per quarter. The Welsh, the Scotch black-face, the Cheviot have been tried upon the Somerset hills, but most farmers have gone back to the improved Exmoor. They have white faces, legs, and fleeces; the wool close set and now increased in weight from 3 pounds up to 4 pounds. Their mutton is of excellent quality. The lambs come in March and April, and are weaned at midsummer. After being turned upon the hills they are brought in at shearing and weaning time, when the lambs are separated and kept for some weeks in inclosures for the purpose. The drafted ewes are often purchased for lamb-breeding, as they are prolific mothers and good nurses.

These sheep, though the denizens of mountains, have habits quite unlike the Welsh, and are at home in the fertile valleys which intersect the range of 1,000 to 1,500 feet elevation. Hill-side cultivation and catch-water meadows are concomitants of their habitat. Where the commons can be inclosed, and the rotations and crops of the low countries adopted, it is found in the event of such changed conditions that a Leicester cross affords the best profit; otherwise, the pure Exmoor gives the best satisfaction. In such facts we see the reason for, and indeed the necessity of, the very breeds of sheep so common in a given district, which may be all unlike a popular and paying race in an adjoining section.

35. *The Dorsets.*—A very ancient race of sheep is found in the county of Dorset, which formerly included a large tract of country. It has some resemblance to the Merino in form, but none in other respects. In 1749 they were described by Ellis as having "white fleeces, white and short legs, broad loins, and fine curled wool." They still have white legs and faces, and show some increase in length of limb and in weight of fleece, which averages about four pounds of fine wool without sufficient softness for goods of first quality. Its great distinguishing peculiarities, which prevent its extinction as a breed, are its early breeding and fecundity, rendering it popular for early lambs, dropped in October, and fit for table at Christmas. There is a paying demand for them raised as house-lambs for the London market. Either Leicester or Southdown rams, preferably the latter, are generally employed, making the lambs a Dorset cross. Some have attributed their peculiarities to an origin in a warm climate; others to the comparative mildness of climate, a calcareous soil, and to the abundance of thyme and aromatic plants in the herbage.

These sheep are hardy, fold well, subsist on scanty pasturage, and wethers at three years old furnish mutton weighing 18 pounds per quarter. While their range has been reduced by the predominance of the modern Leicesters and Southdowns, they maintain a better footing in the county of Somerset than in Dorset itself, exhibiting here slight difference in type, especially showing a pink-colored nose like the Merino, and often called the pink-nosed Somerset. They have also somewhat greater length of wool, larger lambs, and mutton heavier per quarter.

Other varieties of the Dorset group, inhabiting the older commons of the south and west of England, are nearly extinct, though traces of them may still be found. One variety, inhabiting the isle of Portland, still exists in a state of purity. They are small, gentle, of good form, with

a tinge of dun on the face and legs. Their wool is of medium fineness, weighing two pounds per fleece. The wethers often produce mutton weighing ten pounds per quarter.

36. *Welsh mountain-sheep.*—The Welsh is another mountain-breed, indigenous, and still unmodified in the higher elevations, while they are the basis of the more cultivated flocks inhabiting the more productive valleys. They are small, weighing as store-sheep about seven pounds per quarter. The head is small and well set up; the poll clean, except sometimes a tuft upon the forehead; the females generally hornless; the faces unusually white, with occasional instances of gray, speckled, or rusty brown. They are narrow-chested, low-shouldered, high-rumped, long-tailed, active in movement, having little regard for fences or hedges, hardy and thrifty with scanty herbage. The wool is fine, though not very even in quality; fleeces weighing about two pounds. They are not prolific, as one lamb is enough for a mother to care for in mountain-pastures, but are good nurses, and are sought for on that account for breeding fat lambs from Leicester or Down crosses.

In the winter, just before the lambing-season, the ewes are brought down from the mountain-wilds and supplied with small quantities of hay or oats; if the latter, sheaf-oats are used, as the little Welsh sheep would not know what to do with clear grain. Lambs kept in the flock are shorn in July or August; and after weaning, the mothers are milked for a month or two, and butter is made, or the milk is used to improve skim-cheese.

They are too wild for ordinary farm economy of the lowlands, a new lot brought home disappearing in all directions if allowed the opportunity to scatter, and sometimes found on the roofs of neighboring cottages. Cheviots or other breeds do not thrive in their mountain-home, rendering it probable that they will not be superseded, though they may be modified.

37. *Cheviots.*—As the Black-faces monopolize the higher mountain-lands, the Cheviots occupy the lower elevations, the hills of the border counties between England and Scotland. They have been systematically improved by the use of carefully-selected rams of Lincolnshire, before the day of the improved Lincoln race. It has been claimed that the Leicester blood produced the improvement, but the hardiness of the breed and the testimony of the breeders tend to invalidate the opinion. They were formerly light in bone and wool, of scraggy frame, but with a constitution wonderfully hardy.

Draining of lands, provision of shelter, and a greater abundance, both of summer and winter food, have aided the efforts of the breeder, and the result has been one of the most useful and profitable of known breeds of sheep. No animal has contributed so much to the prosperity of the Scottish border and hill farms as the Cheviot sheep. Their mutton ranks very high in Smithfield market, and some people give it a preference over the game-flavored mutton of the Black-face.

These sheep obtain their name from a range of hills running through the border counties of England and Scotland. The original improver of greatest repute is William Robson, of Bilford, who commenced his operations a century ago, and his flock became the nucleus of the ram-supply of all that region for many years. They are deemed useful for crossing with border Leicesters.

Ewes have their first lambs in April, at two years old, and are sold as culls at five or six, being replaced by ewe-lambs. They are sold for producing a crop of half Leicester lambs. A practice has grown up among the hill-farms of sending the young wethers to winter on the grass-lands

of the arable farms, of which they have the outrun from October to April. The cost of this wintering varies from 7 to 9 shillings per head. The main markets are Milrose and Lockeshire for lambs, and Falkirk for ewes and wethers, and Inverness in July, where sales are made "by character."

The fleece is taken off late, rarely before July, and is in constant demand for the manufacture of the goods known as tweeds. It is a middle wool, of better quality than formerly, differing somewhat with differing circumstances, being of superior quality when grown from dry, sweet herbage.

38. *Black-face.*—The breed of British sheep kept to the greatest age, and fed almost exclusively upon the natural growth of permanent pastures, and the management of which, therefore, bears the nearest analogy to our own practice in sheep-husbandry, is that generally known as the Scotch Black-face. It has the widest range of any of the British breeds. It is found, and has been for centuries—so long a period that doubts exist whether they are aboriginal or an importation during the Norman conquest or the Norwegian occupation of the Western Isles—upon nearly all the mountain-lands of Great Britain, including much of the area of Scotland, the mountain-chain extending through the north midland counties of England, and the heath and moor lands both in England and Scotland. They are a hardy race, whose place could not be occupied by any of the more improved breeds, enduring, to an almost incredible extent, both cold and hunger, and getting a fair subsistence beneath the drifts of winter, thriving where the pampered long-wools would starve. Nor are they like the Merinoes. Their wool is of inferior quality, hairy, uneven, used for carpets and coarse cloths, and weighs about three pounds per fleece. The average three-year old wether yields twenty-eight pounds per quarter, deemed unequaled by epicurean taste in quality of meat and richness of gravy. The ewes are kept for five years, and are then drafted without distinction, while the wethers are full-grown and fat on good grass-lands at three; but they are now generally sold for fattening on turnips in the low countries.

Thus the slowest of breeds in maturing is made to subserve the purposes of meat-production, and increase the profits of sheep-husbandry conducted under apparently unfavorable auspices. As in Texas and Colorado in this country, no inclosures separate the flocks. Each has its owner's mark, which is invariably purchased by a succeeding tenant. These marks are known to the shepherds, and every strange sheep is returned promptly to its owner. They are usually branded on the horn, some flocks upon the nose, and others are known by ear-marks. On some farms a small quantity of coarse hay is saved in summer, and in seasons of storm, or great severity of weather, are fed from the stack. On some farms a low-lying field, with some shelter, is provided for the first week; but, as a rule, the "hoggs," as they are called, are sent to the arable or dairy farms of the lowlands, where they have the run of the stubbles and old pastures. From 5 to 6 shillings each are paid for their winter-pasturage of six months. They are especially valued for crossing with the Leicesters, their progeny at twelve months yielding, if well managed, 18 pounds per quarter, and a fleece of 7 or 8 pounds. A second cross is not so successful. A ewe that has dropped a Leicester lamb is called a "milled" ewe, and is held at a reduced valuation; if a second time, a "double-milled" ewe, with further deterioration. This results from the extra size of the lamb, tending to organic derangement in the ewe.

39. *Roscommons.*—Connaught has been for a long period the principal sheep-breeding section of Ireland, and the source of supplies furnished to the great Ballinasloe fair for the graziers of all other parts of the green isle. Culley described the original stock of Connaught as the most awkward and ungainly sheep to be found in the kingdom, with nothing to recommend them but their size. "These sheep are supported by very long, thick, crooked, gray legs; their heads long and ugly, with large, flagging ears, gray faces, and eyes sunk; necks long, and set on below the shoulders; breasts narrow and short, hollow before and behind the shoulders; flat-sided, with high, narrow, herring-backs, hind quarters drooping, and tail set low; in short, they are almost in every respect contrary to what I apprehend a well-formed sheep should be; and it is to be lamented that more attention has not been paid to the breeding of useful stock in an island so fruitful in pasturage as Ireland."

The spirit of improvement reached this district; the smuggling of English animals, the importation of which was strictly prohibited, begat a desire for superior style and more satisfactory returns. At length the restriction was removed, and their improvement was vigorously conducted, the first means employed being a Leicester cross, by which the form was improved and the wool lost much of its coarseness. When it assumed the distinctive and fixed peculiarities of a new breed, it took the name of the Roscommon sheep. The breeders manifested much judgment in perfecting its points and skill in selecting the individuals by which it was accomplished. For the past generation the progress made has been remarkable, compelling the Royal Agricultural Society and the Royal Dublin Society, which for a long time admitted them in a mixed class to their shows, to recognize them as a distinct breed of long-wools, The following statement of their present status is made by Mr. R. O. Pringle, editor of the Irish Farmer's Gazette:

The old Connaught breed of sheep were never fattened until they were three or four years old, when they made great weights, but the mutton was coarse. In consequence of the improvement which has been made in the breed, shearling wedders are now often sold fat to the butcher, making from 25 pounds to over 30 pounds per quarter; but, as a general rule, the Roscommon graziers hold them over until they are thirty months old, at which age they are generally sold in Ballinasloe fair, at prices varying from three to four guineas each, to Leinster graziers, by whom the sheep are kept until they are about three years old, when they make from 36 pounds and upward per quarter. Draft ewes, fed after being cast for breeding, weigh from 34 pounds to 40 pounds per quarter, and the quality of the mutton is unexceptionable. It must be understood that the Roscommon sheep are, in general, reared entirely upon grass, with the help of some hay during winter. Turnip-feeding does not, as in Great Britain, form a material point in sheep-farming as conducted in Roscommon, there being only one acre to turnips grown in that country to each 109 acres of area. These sheep, from first to last, are for the most part reared and fattened without seeing a turnip. In all cases where turnip-feeding is pursued, the Roscommon sheep prove that early maturity, along with heavy weights, has become one of their characteristics; so that if turnip-growing were extended in the west of Ireland, it is only reasonable to believe that Connaught would produce much larger supplies of sheep than is done at present. With the pressure of the meat-market which now exists, this is, therefore, a point which deserves to be seriously considered.

The fleece is soft, deep-grown, rich wool, the first weighing 8 to 10 pounds. Some old ewes have borne fleeces of 14 to 16 pounds; and the fleece of the prize-ram, "Prince Arthur," 24 pounds.

40. FRANCE. Sheep-husbandry in France has had a constant if not a rapid growth in the past century. The numbers were ten and a half millions in 1789. Twenty-three years after Chaptal estimated the total at thirteen and a half millions, yielding 1,718,949 pounds of fine wool, 1,672,199 pounds of medium, and 70,208,926 pounds of coarse wool. In

1867 flocks had increased to thirty millions, but in 1872, after the war, they numbered less than twenty-five millions.*

From such an exhibit it is plain that the Merino race had sixty years ago made little impression upon the flocks of the country, which were indigenous, bearing a fleece of coarse wool. At present the Merino and its grades comprise about two-thirds of the sheep of France.

The largest flocks are found in the mountainous areas of the southwest and of the center, and the distribution and numbers throughout the regional districts into which the country is divided are presented as follows, with the population of each, according to statistics presented at Vienna in 1873:

	Population.	Number of sheep.
Region of the north	2,729,866	3,560,416
Region of the northeast	2,966,404	1,325,222
Region of the southeast	3,832,780	1,793,128
Region of the south	3,478,974	3,320,304
Region of the southwest	5,162,245	5,144,554
Region of the west	4,869,743	1,670,858
Region of the center mountains	3,095,193	5,148,043
Region of the center plains	2,729,866	3,106,443
Region of the northwest	6,278,114	4,344,815
	35,143,185	29,413,783

These figures are official, from the census taken prior to the war, and prior to the reduction indicated in a former paragragh. The population is returned at 36,102,921.

The regions in which there was more than one sheep for every unit of population, according to the above table, were the north, mountains of the center, and plains of the center. The southwest nearly equaled in numbers the aggregate of population.

41. The Merinoes are quite generally distributed, but are most numerous in the hilly districts of the east, from Belgium to the Mediterranean. In the region of the southeast they nearly usurp the pasture-range, a large proportion being grades founded upon native races, but grown mainly for wool. In the plains of Crau, in the western part of the department of Bouches du Rhone, a level, dry, and rocky region, this breed abounds. Here are found the Transhumantes or traveling sheep, which feed upon the winter-herbage of dry plains and spend the summer-months upon the elevated slopes of neighboring mountains, after the manner of sheep-husbandry in Spain—a practice in this country only known in the Rocky Mountains, and especially in the Sierra Nevada range in California. The metis-Merinoes, valued for meat-production as well as wool, are mostly in the northern areas of France, quite numerous north and east of Paris. The Dishley (or Leicester) cross is also abundant in the Plaines du Nord. Merinoes are spread through Des Plaines du Centre, and here are found Solognots, Berrichons, and Bourbonnaises, either pure or crossed with Southdowns or Carmoises. The Barbarine breed, of African origin, is found in the hot plains of the south. The region of the southwest has among its native races the sheep known as Larzac, Roussillon, Lauragnaise, Landaise, and Beaur-

*At the "Concours" at Sante Menehould, September 19, 1875, it was stated by M. Ponsard, president of the central committee of the department of Marne, upon the authority of M. Duchaleau and M. Henzé, inspector-general of agriculture, that the number of sheep in France was reduced from 30,386,283 head in 1866 to 24,707,496 in 1872, a loss of 5,678,787 in six years. M. Duchaleau had attributed this loss to the decline in prices of wool, but M. Ponsard, while admitting the operation of this cause, attributed a portion of the loss to the absurd law which allows the municipal councils to prescribe the number of head per hectare which each farmer is permitted to keep, a prerogative which had been grossly abused.

naise. In portions of this district the Southdown is popular. The Merino wools of France, particularly those of Beauce, Chatillon, and Sauterne, like those of Spain, have a remarkably strong fiber. Brie and Chatillon combine in a high degree strength and softness.

A fleece remarkable for its brilliancy, fineness, and softness, a combing-wood peculiar and valuable, is supplied by the Mauchamp, a cross-breed deriving its fineness from the Merino, distinguished as much for its ugliness of form as for its richness of fleece. An accidental result of breeding was seized upon by M. Graux, and, by will and perseverance, developed into a well-characterized and permanent breed. Its form, originally far from perfect, has attained a good degree of symmetry.

The type of the flock of Naz, created by M. Girod, of Ain, and M. Perrault, of Jotemps, is deemed perfect as a wool-producer, yielding a fiber finer than that of the best Electoral.

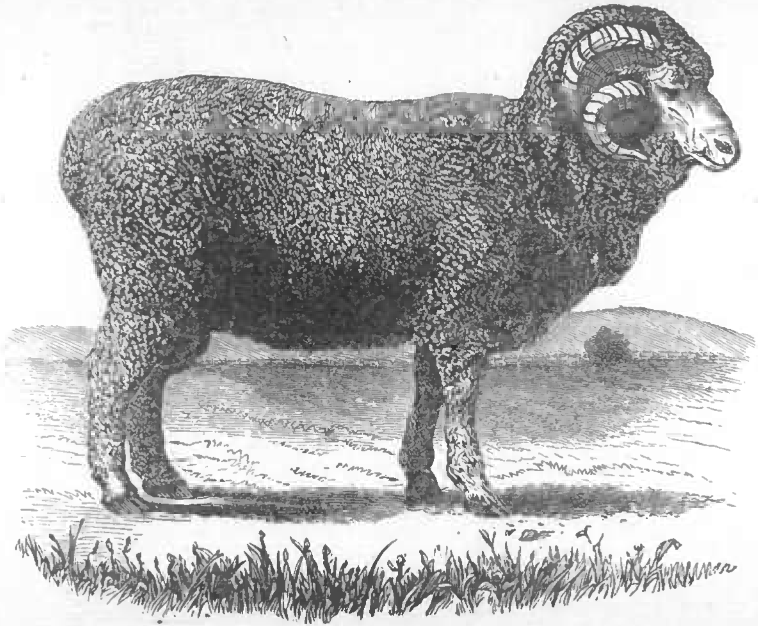
42. The economic and agricultural conditions of France are evidently becoming more favorable to the raising of mutton-sheep. The extension of forage-plant culture, the establishment of rural industries furnishing refuse matter for feeding animals, the use of horses in agricultural labor from the improvement of neighborhood roads, and the ability of the masses to consume meats at higher prices, are circumstances which tend to the dissemination of the English breeds. The influence of the Paris Exposition was important in calling more general attention to the models in mutton-making. As might naturally be expected, it has been found that the Anglicizing of French stock is greatly preferred to the attempted naturalization and extensive breeding of English flocks. In Anglo-French cross-breeds is found satisfactory meat-production as well as desirable fleeces, and they are better suited to the soil, climate, economic conditions, and local demands of the country they inhabit. Southdown crosses upon the native breeds, in the central departments, bear a strong resemblance to English breeds, and differ very essentially from the Southdown and Merino cross in the department of Seine-Inferieure, which approximate the heavy, soft fleeces of the Dishley Merinoes, though still presenting something of the brown tinge of the paternal race. The Dishley (or Leicester) cross with the Merino is more general and popular. It exhibits distinct traces of English blood in small and hornless head, amplitude of barrel, and lightness of bone; and resembles the French ewes in a body better wooled, with a softer and thicker fleece. The preferences of different breeders are shown in the greater prominence given respectively to the English and French types; in one case illustrated by great size and fine conformation, and in the other by a fine and soft fleece, covering well the head and limbs. And these preferences are not mere whims or accidental opinions, but are usually exercised in subordination to sound reason and the dictates of controlling circumstances.

43. As elsewhere throughout the world, the more productive plains and valleys furnish specimens approximating to the mutton-breeds; the more elevated plateaus, the less highly cultivated and valuable lands, are represented by animals valuable more especially for their wool, approaching manifestly the Merino type.

It must be acknowledged that the Merino has assumed the first place in the sheep-husbandry of France. It has in less than a century nearly exterminated the native breeds in large districts, by the constantly progressing modification of form and fleece of the ancient sheep of the country.

Perhaps there has been more diversity of views among improvers

PLATE XXIV



Rambouillet Ram, 1787

than in the United States, where the fashion of a few eminent breeders becomes the *furor* of all engaged in wool-growing, as when the style of excessive grease and unbounded skin-corrugations, "wrinkles" that put money in the purse without rendering an equivalent, commands the following of the craft throughout the country. There has been evidently more originality and independence in the efforts of masters of the principal breeding-flocks of France.

44. The government establishment at Rambouillet exercised a marked influence in its departure from the established ideas of fine-wool breeding. At the first it aimed greatly to increase the size and symmetry of the frame and the weight of the fleece; afterward the example of England was emulated to a degree never attempted by breeders of Merinoes in any country, in striving to increase the feeding capacity and fattening capabilities, and to render the offal less in proportion to weight of meat. In doing this, the original fineness of the wool, which has been the peculiar characteristic of this breed, was sacrificed, but not the value of the fleece, which became very heavy, with a combing-fiber of great length and high utility. The accompanying illustrations (Pl. XXIV and XXV) of an original Rambouillet of 1787 and of the improved sheep of to-day, engraved from drawings prepared under the direction of the French minister of agriculture and commerce, show more plainly than any amount of verbal description the wonderful change which has been effected.

The national bergerie of Rambouillet was established in 1786, at the farm of that name, in the department of Seine-et-Oise, the property of Louis XVI, who obtained from the King of Spain permission to import Merino sheep, and placed 364 selected animals of that breed upon the estate and ordered the erection of suitable buildings for an imperial breeding-establishment. The manager, Count Angivillers, neglected at first to provide shelter for the flock, but found it necessary subsequently to add sheep-sheds to the building-accommodation of the place. Another importation was again made in 1800.

The descendants of these animals have acquired qualities widely differing from the characteristics of their ancesters of even twenty-five years ago. Under the vigilance and care of Tessier and Bourgeois, not only has the breed been kept pure, but it has received a grand and peculiar development, which has given it a world-wide reputation and caused a demand from Merino breeders of America and Australia, as well as of the central nations of Europe. The total value of sheep sold from this establishment from 1797 to 1872 was 3,472,343 francs, averaging 45,688 francs per annum. The number and prices are as follows:

Average prices.

	1797 to 1834.	1835 to 1853.	1854 to 1872.
4,309 rams	462. 16 f.	392. 54 f.	859. 84 f.
3,581 ewes	133. 83 f.	62. 39 f.	398. 86 f.
3,025 mutton-sheep	27. 73 f.	24. 73 f.	37. 54 f.
131,165 kilograms wool	4. 39 f.	2. 90 f.	2. 38 f.

The establishment also has, at a distance of two kilometers from the farm, a flock of Mauchamp Merinoes, a race with a silky wool, which M. Graux in 1828 found in a flock of Merinoes. This subrace has many points of relation to the breed imported in 1786.

The bergerie of Rambouillet is under the direction of M. Bernardin, former pupil of the Agronomic Institute of Versailles.

45. Other breeding-establishments have built upon different models, though the principal flocks can be classed in two categories, one including those in which the wool is the ruling object, the other those in which the meat has perhaps equal prominence. A very small head, cylindrical trunk and light skeleton, and increased proportion of flesh characterize certain flocks; but larger numbers still seek rams of corrugated skin and heavily-wooled extremities. In this class there are few that aim to produce a fiber of extra fineness, and perhaps still fewer that do not obtain fleeces of increased size grown upon animals of greater weight. In this respect France is only yielding to the tendencies of the age in woolen fabrication, and complying with the conditions of successful agriculture in a populous country of comparatively high-priced lands. Still, there are evidences that France is yet able to produce wools of the first grade of fineness.

The national bergerie of Haut-Tingry (Pas-de-Calais) was created in 1843, at Montcarvel, in the same department, and removed to its present location in 1859. Its object is to breed Dishleys and the cross-breed known as Dishley Merinoes; many fine flocks of the latter are found in the northwest and upon the plains of the north.

The establishment at Haut-Tingry embraces 190 hectares (469.5 acres) of arable land and natural prairies. At the close of 1872 it had 179 Dishley rams and 249 Dishley-Merino rams. The animals and fleeces are annually sold at public auction. The following are the average prices (from 1843 to 1869) at which sheep and wool were sold, first at Montcarvel and then at Haut-Tingry:

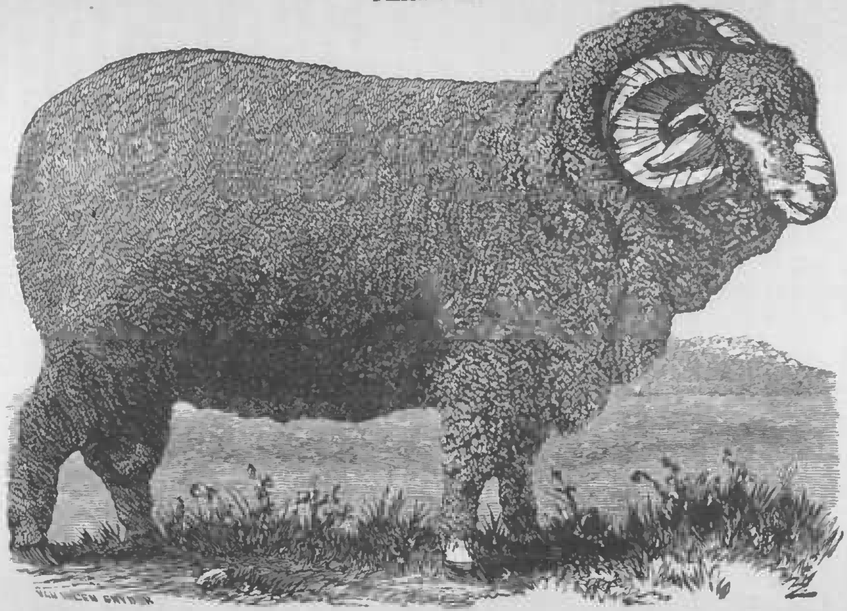
	Montcarvel.	Haut-Tingry.
Rams	274.30 f.	341.16 f.
Ewes	175.00 f.	56.00 f.
Breeding-animals, (animaux de reforme)	29.98 f.	34.50 f.
Wool, per kilogram	2.68 f.	2.10 f.

The higher prices of rams indicate the importance of the crosses that have been effected between the Dishley and the Merino breeds. The establishment at Haut-Tingry, since 1858, has embraced a school of shepherds. The Haut-Tingry establishment is under the direction of M. Guédon, former pupil of Grignon.

The cross-breeds, formed by the use of Merino rams in the native flocks of Brie, Burgundy, Champagne, Provence, Roussillon, and other districts, are among the most profitable sheep of France. They are called metis-Merinoes, or simply metis. The best bear fleeces scarcely less valuable than full-bred Merinoes, and in form and figure equal the Dishley Merinoes. They appear to be improving, acquiring a fixity of type that promises the establishment of a permanent breed. This permanence is already attested by the fact that such flocks, dating back to the beginning of the century, are now improving rather than degenerating. A few years have sufficed to create an enhancement of national wealth which would have required centuries to produce by selection and regimen alone.

46. The degree of aptitude for fattening attained by metis-Merinos, the Dishley cross-breed, and even fine-wool sheep of full blood, as seen in all recent French exhibitions, is very remarkable. It is claimed that

PLATE XXV.



Rambouillet Ram, 1873.

they have equaled the English Southdown and Leicester in fatness and in earliness of maturing, some of these animals at eighteen months showing thirty teeth, while others of three years had only five.

At a recent exhibition at Paris the heaviest Merinoes weighed 84 kilograms; some of the best Southdowns averaged 69 at ten and one-half months; several Dishleys 60, at twelve and one-half; those of the Cotswold-Berrichon cross at the same age, 68; Southdown-Berrichons 44, at eleven months; and Dishley Merinoes 80, at eighteen months. Merinoes weighing 185 pounds will be deemed heavy representatives of the largest of that family.

47. The ancient and unimproved sheep of France are of less economic importance. They are found under various local names, as Berrichons, Bretons, Barbarines, (from Barbary,) Limosins, Poitevins, Solognots, etc., in regions not highly improved or productive of abundant forage-crops. Where improvement of lands begins, and higher culture is coming in vogue, these ancient sheep give immediate sign of going into retiracy, as surely as the red man of America recedes before the advance of the white race. The increase of feeding-material renders necessary the introduction of a breed for which a profit can be derived in feeding; and the receipt of a substantial return for forage consumed begets a desire for the extension of the flock; and so these conditions act and re-act upon each other, as is so often observed in this country, in Great Britain, and elsewhere, producing modifications of farm animals as well as of farm economy generally.

48. When a higher culture has been adopted, and the ability to produce better mutton achieved, the cultivator finds it a slow process to change the character of his flock by the influence of regimen and selection of animals for coupling, and prefers to adopt the surer and more rapid means of amelioration afforded by cross-breeding, which produces positive and immediate results. This accounts for the wholesale production of cross-breeds in certain districts in France. It is the attainment of fortune by intermarriage and resulting inheritance rather than by a life-time accumulation of small savings—a plan that works more satisfactorily with the ovine race than with the human.

The benefit of crossing is here still more positively recognized in the improvement of wool, which is thought to yield more slowly to the influence of regimen than size and weight, and tendency to fatten.

While the value of these results is so evident, it has been a matter for surprise that the unimproved sheep are so numerous. One reason is seen in the fact of the immense number of small proprietors, who deprecate change, and still consume their fleeces in domestic manufactures, using the same rude machinery, and giving the same negligent care to their animals, without reflecting that improved animals give a larger fleece in proportion to weight, and wool of better quality, and that such substitution would give their needed home supplies and a surplus for sale, without increasing the number of their flocks.

49. Upon a review of French sheep-husbandry, the candid observer must admit that intelligent flock-masters have in the main been wise in their refusal to sacrifice wool to meat, and attempt to vie with England in a course of breeding which is compulsory in that climate, choosing instead to produce a class of wool for which the peculiar character of their manufactures makes a strong demand. The extending use of combing-wools, not the coarse fiber of great length produced by the mutton-breeds, but that having much of the fineness of Merino wool, with a material increase in length, has greatly stimulated the steady progress observed in this direction, and the increase of forage supplies

has had its share in such modification of the Merino. Breeders have demonstrated, perhaps more successfully than in any other nation, that improvement in intrinsic value of fleece and increase in meat production may keep pace with each other. The climate, soil, and agronomic conditions of this country have permitted this result.

50. AUSTRIA-HUNGARY. At the time of the dispersion of Spanish sheep through the principal sheep-walks of Europe, Austria was prompt to share the boon of fine wool. In 1775 the Empress Maria Theresa imported into Hungary 300 Merinoes, and located them at the imperial farm of Meropail. A school of shepherds was established, other importations were made, and the numbers of the new race increased and the modification, in some sections extinction, of the native races resulted.

The number of sheep of all kinds in Austria proper is between five and six millions; in Hungary, fifteen millions. In Hungary proper the number exceeds that of the population, a large proportion is of Merino blood, and the wool is remarkable for great softness and firmness, and cotton-like touch and aspect, not equal in strength to the German, and suited only to the light tissues. The great plains, so like our own western prairies, rich with abundant and enduring elements of fertility, furnish the best sheep-walks of Europe, in which the business of fine wools can be profitably carried on so long as it can exist in any portion of the continent. The wool of Galicia and of the archduchy of Austria is very similar, though not of equal fineness, the inferior grades having more hairy fiber. Moravia furnishes an excellent cloth-wool, coarser than the Hungarian. Those of Austrian Silesia approach the wools of Prussian Silesia in strength of fiber, with an approximation to the tenuity of the Hungarian. That of Bohemia is strong and hard, not very symmetrical, and especially adapted to combing purposes. A large proportion of Austrian superfine wools are used for cloth; fine wools are employed in both processes; medium mainly for combing, and some of the common wools of greater length are substituted for English long combing-wools and used in certain manufactures, and another class of it goes into low-priced cloth. M. Louis Moll, of France, makes the following classification of the wools of the Austrian Empire, produced in 1866, which will substantially indicate the quantity and styles at present grown:

	Superfine.	Fine.	Medium and ordinary.	Common.	Total.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Hungary	1,234,800	6,174,000	24,696,000	1,234,800	33,339,600
Bohemia	242,550	1,852,200	1,852,200		3,946,950
Moravia	121,275	749,700	749,700		1,620,675
Silesia	187,425	496,125	496,125		1,179,675
Galicia		749,700	1,234,800	1,852,200	3,836,700
Other provinces		242,550	1,234,800		1,477,350
Total	1,786,050	10,264,275	30,263,625	3,087,000	45,400,950

51. According to the Hungarian census of 1870, Hungary had 15,077,000 sheep, an increase in thirteen years of 33 per cent., while horses increased only 3 per cent., cattle declined 6 per cent., and swine in a less degree. In Middle and Lower Hungary there are districts having as many as 5,000 to 6,000 sheep per square mile. In Hungary proper the number per square mile was 3,197, and 1,072 for every 1,000 inhabitants. In Siebenbergen the number was 1,928 to each square mile; in

Croatia and Slavonia, 1,016; and in the Military Boundary, 1,673. This region is the great sheep-walk of Europe. The export of wool in 1870 was 277,784 tons, worth 25,545,502 gulden, or more than $12,000,000 in gold.

The flocks of Hungary are mainly Merinoes, a few native sheep still remaining, and several flocks of native sheep cross-bred with Southdowns. The lands are becoming more valuable, arable culture is encroaching on the meadows, and supplies of forage are made necessary. Lucerne is found valuable both for summer and winter feeding. Red clover and sanfoin do not thrive on the dry plains. The French process of making "sour-hay" by fermentation is practiced considerably, both with maize and grass, the trenches being 4 feet by 6 or 8, and the forage compactly laid and covered with a foot of earth. It is common to keep the best flocks under cover at night and at midday in summer, and day and night in winter. They are not folded upon turnips as in England.

The lambing occurs at two seasons, April and May, and August and September, the ewes being carefully sheltered. The ewes are good nurses, of only moderate quality as milkers. The shearing is done in May, by women, in shearing-houses. In washing they are dipped a few times, then made to sweat to soften the dirt, after which they are washed and made to swim in clean water; in warm washing, with soap, a similar course is pursued, ending with cold water. Spring-lambs are washed in August. Breeding-ewes are sometimes fed with mangel-wurzel pulped with hay and straw. Store-sheep are rarely ever so fed. Culls are generally sold at low prices; in some cases they are fed and sold fat to butchers. Corn and oil cake are fed occasionally to rams.

The Hungarian Merino is horned in both sexes, the head well covered with wool. It is smaller than the French and Prussian, especially the Rambouillets, of which type few are found in Hungary.

52. GERMANY. The introduction of Spanish sheep into Germany commenced before the close of the last century, and actively continued during the first years of the present, has given great prominence to wool-growing industry, and has been the prime instrumentality in establishing the present high reputation of German woolens. Soon German wools began a sharp competition in the English market with the fine wools of Spain, and in a few years more almost drove Spanish fleece from English manufactories. The course of this contest affords a striking illustration of the rapidity and extent of the improvement in the hands of the industrious and patient German flock-masters. The imports of Great Britain derived from these countries were as follows, for the dates named:

	1800.	1814.	1827.
Germany	421,850	3,595,146	22,007,198
Spain and Portugal	7,799,758	9,284,991	4,349,643

53. At the beginning of the improvement, and for a generation afterward, extreme fineness of wool was the constant and principal aim in breeding. It was carried so to excess that the constitutional vigor of the finest flocks was much impaired, and the light weight of fleeces was scarcely compensated by the highest prices paid for wool. Increasing commercial facilities and activities, the growing competition of South American and the British colonies, increase of population demanding enlarged meat-supplies, conspired to reduce the price of fine wool, and

to bring about a revolution in sheep-breeding. In populous regions, areas of high culture, wool became subsidiary to mutton, a change effected by crossing Merino or native sheep with the Southdown or with the other Down families or with the Leicester. In districts of sparse population and low culture, and consequent low prices of mutton, the wool interest has retained its prominence, and by producing a fine grade of medium wool in heavy fleeces, with some attention to the flesh-making quality of the flock, the business has been quite remunerative.

The Merino race and its grades now constitute about half of the flocks of the German Empire. As divided by reliable local authority, there are 14,000,000 Merinoes, 7,000,000 English breeds and their crosses, and 8,000,000 native sheep, making in all 29,000,000. The annual wool-production is estimated at 125,000,000 pounds.

54. The mutton-interest is seen to have attained large proportions, and the tendency is still toward meat-production and large fleeces of medium fineness. It has required many years and bitter experience to produce this change. A comparison of prices at Berlin and Breslau, for forty-one years, illustrates the approximation in prices of fine and coarse wool that has taken place throughout the world, and renders plain the reason for enforcement of the policy that now rules in sheep-breeding:

	1830.	1840.	1850.	1860.	1870.	1871.
EXTRA FINE WOOL.						
Berlin	110	115	110	103	......	69
Breslau	150	125	140	118	106	106
FINE WOOL.						
Berlin	76	78	85	91	63	59
Breslau	97	85	110	106	86	90
MEDIUM WOOL.						
Berlin	62	53	62	79	53	56
Breslau	77	65	80	94	67	71
COARSE WOOL.						
Berlin	46	38	42	60	45	49
Breslau	42	52	65	71	54	57

This is similar to the course of the market in Pesth, Hungary, from 1843 to 1872, during which period extra fine wool increased in price 14.8 per cent., fine 25.7, medium 46, and ordinary 60 per cent.

55. Saxony was the scene of the earlier triumphs of breeding in the production of wool of a fineness not surpassed in the world. The Elector of Saxony, at the close of the seven years' war, in 1765, is said to have obtained from the King of Spain 100 Merino rams and 200 ewes, from the best Spanish flocks. He kept a portion on his own farms, near Dresden, and distributed the remainder through his dominion. Fine flocks are yet found there, though the force of circumstances has compelled a modification of fleece and form. The Electoral type predominates in Saxony, though for twenty-five years there has been a gradual departure from the extreme fineness by which the fame of Saxony wool was originally gained.

In few countries, if in any, has the business of sheep-breeding been so systematic as in Saxony. The best flocks have been under the management of educated agriculturists, either proprietors or employed flock-masters. Rams are selected with great care, and if the proprietor distrusts his own judgment, he employs an expert to make the selection. The most complete order is enjoined in all respects; stables are ample and cleanly; their temperature regulated by thermometers; fodder abun-

dant and well kept. The lambs come in summer rather than in winter, and to this fact is attributed much of the reputation of Silesian sheep for hardiness and healthfulness.

56. Prussian Silesia has been almost equally distinguished for successful wool-growing. Following in the footsteps of Saxony, obtaining fine stock from that neighbor country rather than by original importations from Spain, the same preference for fineness of fiber naturally ruled the selection of breeding-stock, and the result was an early and wide-spread celebrity for wool of great fineness and value, and a profitable demand for thorough-bred rams for improvement of the flocks of European and more distant countries, including Australia and America. Though never so famous for "high-fine" fleeces as Saxony, Silesia has won the distinction of a more active and extensive demand for breeding-rams, by reason of their heavier fleeces and greater vitality. The departure from the Electoral type, characterized by its short and fine fiber, small size, and delicacy of organization, dates from the time when England began to forsake Germany for her own colonies in her search for wools. At this discovery a panic ensued, flocks were diminished, the short-sighted left the business, and the shrewd and far-seeing proceeded to inaugurate a radical change in the course of breeding by which sheep of larger size and greater vigor, yielding heavier fleeces of longer and coarser fiber, were substituted for the modified Electorals which had been bred from Saxon originals. Circumstances were favorable; the climate was moderate, the grasses nutritious, the surface dry and undulating, and flocks were therefore in full health and vigor, favorable to continued improvement, which progressed in the direction of comparative softness and elasticity of fiber, while size, constitution, and weight of fleece were maintained in a high degree. A wise care was exercised toward the improvement of pastures, the selection of food-plants most desirable for sheep, and ample provision for equal and constant food-supplies throughout the year, as experience taught the necessity of such care to uniformity and abundance of the fiber.

The Silesian flocks of the present time, of Merino blood, are tending still further from the Electoral type, once so popular, toward a more compact frame and heavier fleece. It is beginning to be acknowledged, in the very strongholds of fine wools, that no country of dense population and high prices of lands can afford to limit its aim in sheep-breeding to the production of wool alone.

57. Bavaria, which has not been regarded as a sheep-raising country of much note, is bestowing more attention upon this interest. Valuable flocks may now be found in the Suabian and Neuburg districts, and in the three Frankish provinces, Upper Pfalz, and in the Pfalz. The Merino race has been represented here for three-fourths of a century, yet a considerable proportion are Zaupels and other native breeds. Improvement has of late been rife, but cross-bred animals are sought rather than Merinoes, such as are well developed, thrifty, easy to fatten, producing acceptable mutton and a medium grade of wool. The Zaupels have a coarse, long wool, suitable for smooth stuffs of coarse texture, and available for flannels and yarns. They fatten easily, and their meat is of good quality. They are small, weighing only 40 to 50 pounds.

Styrian sheep, descendants of the Bergamask race, have been brought from the Styrian and Carinthian Mountains, in the course of trade with Upper and Lower Bavaria, and have spread to the Danube River, and through the valley of the Iser. They are heavier than the German sheep, with long heads, pendulous ears, and long legs. They are hardy,

fatten readily, but their meat is coarse and bones large, and as wool-bearers they are inferior to the German sheep. The mountain-sheep of Upper Bavaria and Algau are related to the Styrian, but are smaller, with coarser wool.

Some of the larger estates still adhere to Merino flocks of the Electoral type, of small size, weighing only 48 to 50 pounds, live weight.

In Neuburg are flocks of very fine cross-bred sheep, mature wethers weighing 95 to 110 pounds, and ewes 75 to 80 pounds, and yielding wool 2½ to 3½ inches long, (*secunda* and *tertia* grades,) useful both as a cloth-wool and combing-wool. The coarse German cross-breds (Rauhbaster) are mostly found on smaller estates, especially near Bamberg and in the Main Valley. The ewes weigh 85 to 95 pounds, the wethers 110 to 120 pounds. The fleeces average 3 to 4½ pounds, of *tertia* and *quarta* grades. The true German sheep, or "land-sheep," unimproved, are scattered through the Frankish provinces and Upper Pfalz.

Only one of the government Merino breeding-folds now remains on the public estate at Schleisheim, though individual sheep-raisers have established valuable flocks for breeding purposes, both of Merinoes and Southdowns. The Schleisheim flock has been in existence since 1802.

Throughout Germany the tendency exists, modified variously by the circumstances briefly touched upon in this chapter, toward the production of more and better mutton in connection with such supplies of wool as the required modification of breeding and feeding naturally produces.

58. RUSSIA.—The immense areas of natural pasturage in Russia are capable of sustaining vast numbers of sheep, which have been increasing constantly, until the aggregate probably reaches 50,000,000, the number reported in 1870 being 48,132,000. The Merinoes comprise only about one-fifth of the whole number. The Electoral was established in some sections, especially in Polish provinces, but the Negretti gives better satisfaction and now predominates. The Russian Negretti is claimed to excel the Merino of any other name or country in hardiness. The immense flocks of the great plains become hardy by the "survival of the fittest" in the encounter of the elements and sharp competition for the means of subsistence.

There are flocks of immense size in Russia. One at Novo-Voroutsovka numbers 30,000 Merinoes, 600 Montaguardo sheep, besides 1,000 Angora goats. Another is reported of 50,000.

CHAPTER III.

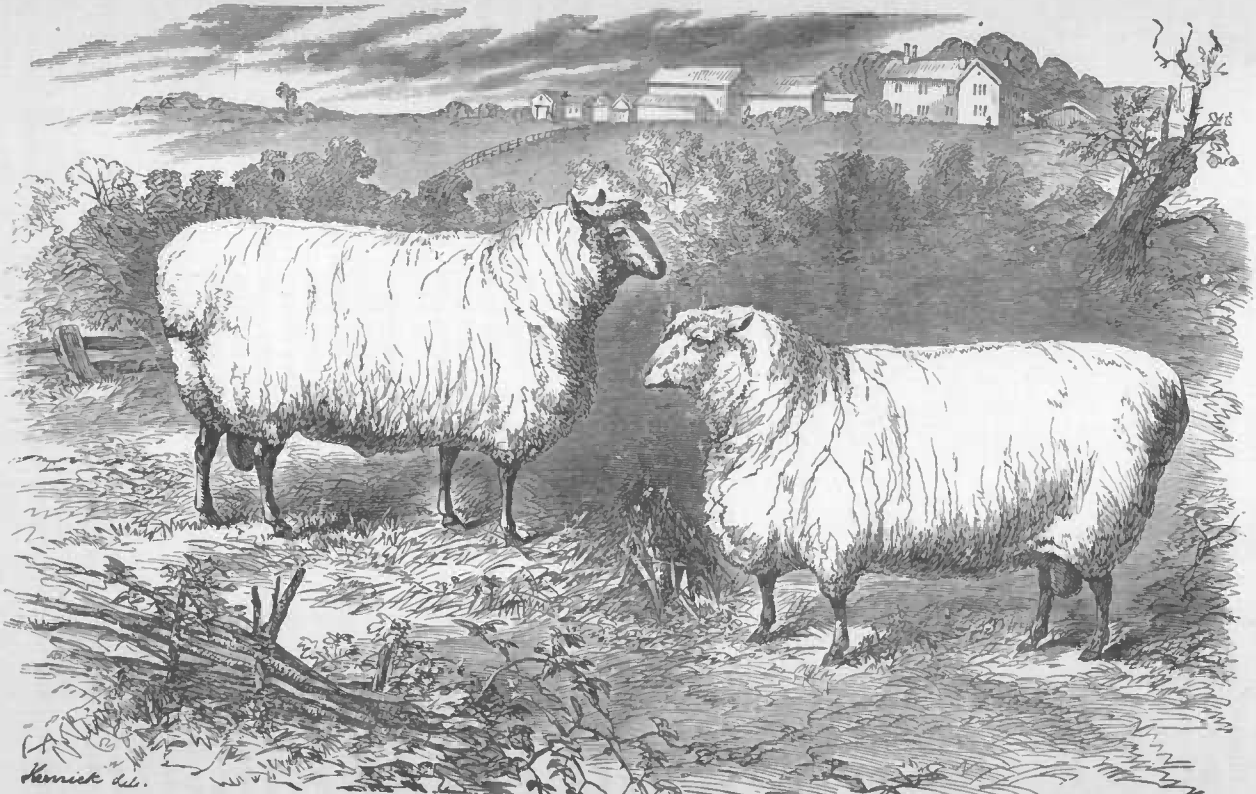
INCREASE OF PRODUCTION AND MANUFACTURE.

INCREASE OF WOOL-GROWING IN THE UNITED STATES; GREAT PROGRESS IN MANUFACTURE; THE WOOL-PRODUCT OF THE WORLD.

59. As has been briefly shown in the preceding chapter, the development of the factory system of woolen industry throughout the world has been, in very large proportion, the result of the enterprise of the past hundred years. Prior to that time the woolen clothing of all countries was largely the product of home industry. At the present date home manufacture of woolens is a comparatively small industry in any portion of the world, especially in the more cultivated and progressive countries.

With the first settlers of the wilds of America came selections from

PLATE XXVI.



COTSWOLD RAMS.

the domestic animals of Europe, but the numbers were small up to the close of the seventeenth century, about which time the impulse to improve the grade and increase the quantity of wool, which so interested the bucolic mind of England, and Germany, and France, began to be felt in the United States, and importations of Spanish Merinoes were made by enthusiastic breeders. The farmers were generally slow to see the advantage of the improvement, yet flocks increased, a better quality of wool stimulated manufacture, and at the commencement of the war with Great Britain, which was inaugurated in part to cripple the growing manufactures of the colony, and thus demonstrate the peculiarly British idea of freedom of trade, (which means the freedom of home-trade and the destruction of colonial manufacture,) the wool-product was rapidly increasing and manufactures were extending and prospering, amounting in 1810 to the value of $25,608,788.

60. At the close of that war, with manufacturing prostrate and importations excessive, this industry had a bare existence; and in 1820 the value of its products was only $4,413,068. Its rate of increase since has been variable, as tariff legislation has fluctuated. In 1830 the total was $14,528,166; in 1840, $20,696,999; in 1850, $43,207,545, reaching $61,894,986 in 1860. But the great advance of this interest, its magnificent achievement in new styles and superior qualities of goods, has been since that date. In 1870 the total value of all products was $155,405,358. The numbers of establishments, of cards, and of hands employed are given in detail for the several States:

States and Territories.	Establishments.			Hands employed.			No. of sets of cards.	
	1870.	1860.	1850.	1870.	1860.	1850.	1870.	1860.
Alabama	14	6	....	41	198	....	24	14
Arkansas	13	....	....	31	....	....	17	....
California	5	1	....	659	60	....	46	6
Connecticut	108	84	149	7,297	3,767	5,488	660	265
Delaware	11	4	8	399	114	140	30	8
District of Columbia	....	....	1	....	....	2	....	....
Florida	1	....	....	1	....	....	1	....
Georgia	46	11	3	563	383	78	72	30
Illinois	109	21	16	1,736	162	178	250	37
Indiana	175	79	33	2,469	533	246	346	112
Iowa	85	12	1	1,088	120	7	199	13
Kansas	9	....	....	91	....	....	24	....
Kentucky	125	37	25	683	437	318	208	83
Louisiana	2	1	....	29	60	....	12	4
Maine	107	26	36	3,042	1,027	624	331	80
Maryland	31	27	38	327	381	362	60	44
Massachusetts	185	134	119	20,550	12,969	11,130	1,367	821
Michigan	54	16	15	667	126	129	116	14
Minnesota	10	....	....	146	....	....	19	....
Mississippi	11	4	....	116	235	....	17	13
Missouri	156	11	1	718	70	25	258	15
New Hampshire	77	51	61	3,750	1,518	2,127	351	146
New Jersey	29	35	41	1,094	835	898	81	61
New Mexico	1	....	....	20	....	....	1	....
New York	252	140	249	8,812	4,220	6,674	845	324
North Carolina	52	7	1	249	253	30	78	23
Ohio	223	115	130	2,243	728	1,201	334	173
Oregon	9	1	....	179	30	....	21	4
Pennsylvania	457	270	380	12,764	6,089	5,726	1,317	483
Rhode Island	65	57	45	6,363	4,229	1,758	474	253
South Carolina	15	1	....	53	92	....	25	10
Tennessee	148	1	4	428	10	17	177	1
Texas	20	2	1	100	43	8	29	4
Utah	15	....	....	106	....	....	19	....
Vermont	65	46	72	1,870	2,073	1,393	175	99
Virginia	68	45	121	278	494	668	116	50
Vest Virginia	74	....	....	316	....	....	132	....
Wisconsin	64	15	9	775	105	25	134	19
Total	2,891	1,260	1,559	80,053	41,360	39,252	8,336	3,209

To supply material for this rapid growth, the home production of wool has been insufficient. The census-returns of sheep and wool are as follows:

	Number of sheep.	Pounds of wool.
1850	21,723,220	52,516,959
1860	22,471,275	60,264,913
1870	28,477,951	100,102,387

These figures are not complete, as they only give an approximation of the number of sheep actually on farms at the date of the return, and the amount of wool is still less complete, as the returns of fleeces of sheep slaughtered in cities are not given. The real number of sheep in 1870 was not less than 34,000,000, and the quantity of wool estimated by the writer at that date was 135,000,000, which was not too high, and was probably somewhat less than the actual product. The present number, not less than 36,000,000, are estimated to produce, without including the additional fleeces of those slaughtered within the past year, 155,000,000 pounds.

In addition to the domestic product, the annual receipts of wool from foreign countries since 1860, with the value of woolens imported, are as follows:

Years.	Woolens.	Wool.		
	Value.	Pounds.	Value.	Cents per pound.
1861	$28,261,039	36,000,000	$4,961,326	13.7
1862	14,884,394	43,571,026	6,994,606	16
1863	20,411,625	73,897,807	12,553,931	16.9
1864	32,139,336	90,396,104	15,923,991	17.6
1865	20,347,563	43,858,154	7,728,383	17.6
1866	57,115,901	67,917,031	9,381,083	13.8
1867	45,813,212	36,318,299	5,915,178	16
1868	32,371,329	24,124,803	3,792,659	15.7
1869	34,560,324	39,275,926	5,600,958	14.2
1870	34,435,623	49,230,199	6,743,350	13.6
1871	43,751,973	68,058,028	9,780,443	14.3
1872	52,176,260	122,256,499	26,214,195	21.5
1873	50,875,805	85,496,049	20,433,938	23.9
1874	46,732,032	42,939,541	8,250,306	19.2
1875	44,440,940	54,903,654	11,069,701	20.1

The average importation of wools was, therefore, about 57,000,000 pounds for the war period, 43,000,000 for the subsequent five years, and 74,000,000 for the last five years. The average cost for the period of ten years was $7,959,546 per annum; since, $15,149,716.

These supplies are obtained mainly from South America, England, Australia, and South Africa, in proportions as follows:

Years.	Great Britain.	South Africa.	Australia.	Argentine Republic.	Uruguay.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
1862	16,006,963	3,920,257	783,670	5,786,868	14,061
1863	17,619,123	6,711,975	118,234	17,461,208	476,815
1864	13,099,501	13,717,900	864,548	23,951,506	3,490,800
1865	1,980,176	8,312,768	408,592	16,103,889	1,164,260
1866	8,541,195	7,424,217	874,119	36,916,794	2,224,629
1867	6,758,820	2,033,020	467,025	12,666,274	1,434,594
1868	2,581,678	964,314	....	5,835,864	466,712
1869	8,598,299	2,644,504	....	8,249,659	932,369
1870	8,140,697	5,089,153	168,902	16,721,420	1,547,106
1871	15,593,166	6,699,057	19,957	23,333,237	4,594,238
1872	40,250,449	14,820,876	12,748,548	24,731,834	7,110,871
1873	19,040,920	12,830,858	7,661,262	17,449,563	6,110,911
1874	7,966,382	4,622,273	3,905,671	8,502,627	4,094,275

The increase of the average price in recent years, as seen in a former table, is explained by the large proportion, as shown above, obtained from Great Britain and her colonies, producing wool of better quality and higher price than that of South America.

The average supply since 1870 may properly be placed at 224,000,000 pounds, of which two-thirds is home-grown; but the nominal third of the foreign is mostly unwashed merino and low-grade carpet-wool, constituting not more than one-fourth of the value of our wool-supply.

Nor is this the whole extent of our woolen manufacture. There is a large amount of shoddy, mungo, and other material, as well as cotton and other vegetable fiber, that is used to adulterate and extend the production of woolens. Of these, the recent imports of shoddy are as follows:

Years.	Pounds.	Value.	Price per pound.
			Cents.
1862	6,291,077	$442,376	7
1863	7,867,601	581,234	7.3
1864	8,133,391	621,514	7.6
1865	4,863,064	410,395	8.4
1866	7,147,108	589,490	8.2
1867	5,220,296	518,479	9.9
1868	556,414	49,649	8.9
1869	832,283	68,103	8.1
1870	512,792	55,009	10.7
Total	41,424,026	3,336,249	....
Average	4,602,669	370,694	8
Average for the past five years	1,831,456	163,964	8.9

61. The record of our importation of woolen goods should also be presented. Going back to 1820, and dividing the values of imports by decades, we have the following result for fifty-five years:

	Aggregate.	Annual average.
Ten years ending 1830	$86,182,110	$8,618,211
Ten years ending 1840	129,336,258	12,933,625
Ten years ending 1850	109,023,552	10,902,355
Ten years ending 1860	282,682,830	28,268,283
Ten years ending 1870	320,340,346	32,034,034
Five years ending 1875	237,976,988	23,797,698
Total in fifty-five years	1,165,542,084	21,191,674

It is a suggestive and gratifying fact, that while the value of our manufactures is about four times as great as in 1850, the average of imports of woolens of the past five years ($23,797,698) exceeds but little that of the entire period of fifty-five years, ($21,191,674,) beginning with the very infancy of this beneficent industry. It is particularly noteworthy that our imports since 1870 are less by several millions annually than for the period between 1850 and 1860, notwithstanding the immense increase in the consumption of woolen goods.

62. The necessities of the Government for revenue, and the happy agreement of producers of wool and makers of cloth, have conspired to give a stability to customs-legislation for a period comparatively long, and a profit to both manufacturers and wool-growers, and at the same time lower prices to consumers of woolen goods than could be possible in the cloth-famine resulting from consumption without production in the United States. If now the interests of mere carriers, who desire larger profits for *handling* goods than manufacturers expect for *making* them, are not again made paramount, the future of the woolen manufac-

ture will soon be secure; new triumphs of invention will be gained, every variety of fabric will be produced in this country, and all classes will thrive equally, except that importers of woolens will fail to realize their thousands with greater ease than the wool-grower now obtains his hard-earned dollars.

It is not proposed to enter into details of wool-growing in this country, to describe its breeds, report the progress of improvement, or indicate the probable direction of future efforts of sheep-breeders. It is sufficient here to say that the American Merino is still the sheep of the country, with a distinctive character of its own, and a higher value for our uses than its most noted congeners abroad; that sheep-husbandry is increasing, not east of the Missouri, but manifestly in the continental area of nutritious pasturage beyond, and that the production of early lambs and fat mutton, with the increase of the numbers of easily-fattening breeds, is making slow but sure progress in the more populous and highly-cultivated districts.

63. WOOL-PRODUCT OF THE WORLD.—In conclusion, I will attempt to give, from examination of official records of wool-production, and from comparison of estimates of experts where no official data are found, or where such records are several years in arrears, an approximate idea of the amount of wool produced in the world, and also the numbers of sheep of all kinds that are domesticated and kept for the production of wool. In this investigation the incompleteness and tardiness of official enumerations, and the evident lack of public appreciation of the value of statistics, is painfully apparent; and yet the enumeration of domestic animals is among the simplest and most practicable of accomplishment of all census-work. In the more advanced and intelligent communities, these records are nearest complete. The official returns of sheep rarely if ever exceed the true numbers; it is often the case that they underestimate them. It is believed that in this country the census-aggregates approximate closely the real numbers, except in Texas, California, and in some border States, in which large flocks are kept in situations remote from the view of assessors. The census of Great Britain is probably quite accurate, and that of the central countries of Europe measurably so. The latest available official publications of the numbers of sheep in European countries, some of them eight to ten years in arrears of the present date, are given as follows:

Countries.	Date.	Sheep and lambs.	Countries.	Date.	Sheep and lambs.
Great Britain	1874	30,313,914	Belgium	1866	586,097
Ireland	1874	4,437,613	France	1872	24,589,647
Russia	1870	48,132,000	Portugal	1870	2,706,777
Sweden	1872	1,659,644	Spain	1865	22,054,967
Norway	1865	1,710,000	Italy	1867	11,040,339
Denmark	1871	1,842,481	Austria, (proper)	1871	5,026,398
Prussia	1873	19,624,758	Hungary	1871	15,076,997
Würtemburg	1873	577,290	Switzerland	1866	447,001
Bavaria	1873	1,342,190	Greece	1867	2,539,538
Saxony	1867	304,087			
Holland	1872	855,265	Total	......	194,867,003

Next to the European flocks in numbers and in alliance of blood and proprietary interest are those of Australia, which here includes all British colonies in that antipodal region. The increase of sheep has been marvelous. The imports of Great Britain from that quarter were only 10,000,000 pounds of wool in 1840; they were 39,000,000 in 1850; 53,000,000 in 1859; 158,000,000 in 1869; and 238,000,000 in 1874. Since 1868 all these colonies, except Queensland and Tasmania, have increased their flocks, some of them very heavily, averaging in the table below

about 17 per cent. notwithstanding the decrease in the two named. It is really more, probably at least 20 per cent., as the latest New Zealand figures are those of 1871, some of the others of 1873, and some of 1874. The returns are as follows, being the latest extant at the respective dates of publication, 1868 and 1874:

Colonies.	1868.	1874.
New South Wales	13,909,574	19,928,590
Victoria	9,532,811	11,323,080
South Australia	4,477,445	5,617,419
West Australia	599,756	748,536
Queensland	8,921,784	6,687,907
Tasmania	1,742,914	1,490,746
New Zealand	8,409,919	9,700,629
Total	47,594,203	55,496,907

In Asia the investigation rests necessarily upon more obscure data, and the more moderate estimates are excepted. The estimate, 350,000,000 pounds, covers the entire area of Asia, consisting mainly of the wool of Asiatic Russia, Turkey, Persia, and India, as large portions of China and Japan are said to be substantially non-producing. It is less by 30 per cent. than some current estimates, and believed to be more consistent with a conservative and judicious view of the probabilities.

There has been a recent increase in the production of the Cape of Good Hope, and the estimate is certainly not too high, in fact scarcely more than the actual shipments for the past two or three years. As to South America, it is difficult to find in any markets, or in home consumption, the quantity sometimes attributed to this quarter of the globe.

After careful analysis of recent and former statistics the following estimate is presented both of sheep and wool:

Countries.	Number of sheep.	Pounds of wool.
Europe:		
Great Britain	35,000,000	218,000,000
German Empire	29,000,000	125,000,000
Austria-Hungary	21,000,000	60,000,000
Russia	50,000,000	138,000,000
France	26,000,000	124,000,000
Spain	22,000,000	69,000,000
Portugal	2,750,000	11,000,000
Italy	11,000,000	38,000,000
Turkey	15,000,000	37,500,000
Greece	2,600,000	7,500,000
Switzerland	550,000	2,500,000
Denmark	1,900,000	8,000,000
Holland	900,000	4,500,000
Belgium	600,000	3,500,000
Sweden	1,700,000	6,000,000
Norway	1,750,000	6,250,000
Total	221,750,000	858,750,000
America:		
United States	36,000,000	185,000,000
Canada	2,000,000	8,000,000
South America and Mexico	58,000,000	174,000,000
Total	96,000,000	367,000,000
Asia	175,000,000	350,000,000
Africa:		
Northern	20,000,000	45,000,000
Cape of Good Hope	12,000,000	51,000,000
Total	32,000,000	96,000,000
Australia	60,000,000	255,000,000
Grand total	584,750,000	1,926,750,000

The estimate of Great Britain is based upon $4\frac{3}{4}$ pounds of wool per fleece, with 52,000,000 pounds for wool of sheep butchered during the year. The number thus disposed of is usually reckoned at three-eighths of the standing numbers of the flocks. In the German Empire the average is placed at $3\frac{2}{3}$ pounds, with 6,000,000 fleeces of 3 pounds from slaughtered sheep. Hungarian fleeces are lighter, and in Austria-Hungary the extra fleeces are assumed to bring the average nearly to 3 pounds for each sheep. France produces heavier sheep and fleeces than the German States, more mutton-sheep, with a larger proportion annually slaughtered, making 124,000,000 pounds for standing flocks of 26,000,000 sheep a reasonable estimate. The South American fleeces are variable, but the average is much lower than in South Africa or Australia, and the sheep of Asia cannot be safely estimated to yield more than 2 pounds each.

There are some sheep in the islands of the Pacific, rendering the total estimate of 2,000,000,000 pounds very probable, and the number of sheep of the world 600,000,000 in round numbers.

STATISTICS OF FORESTRY.

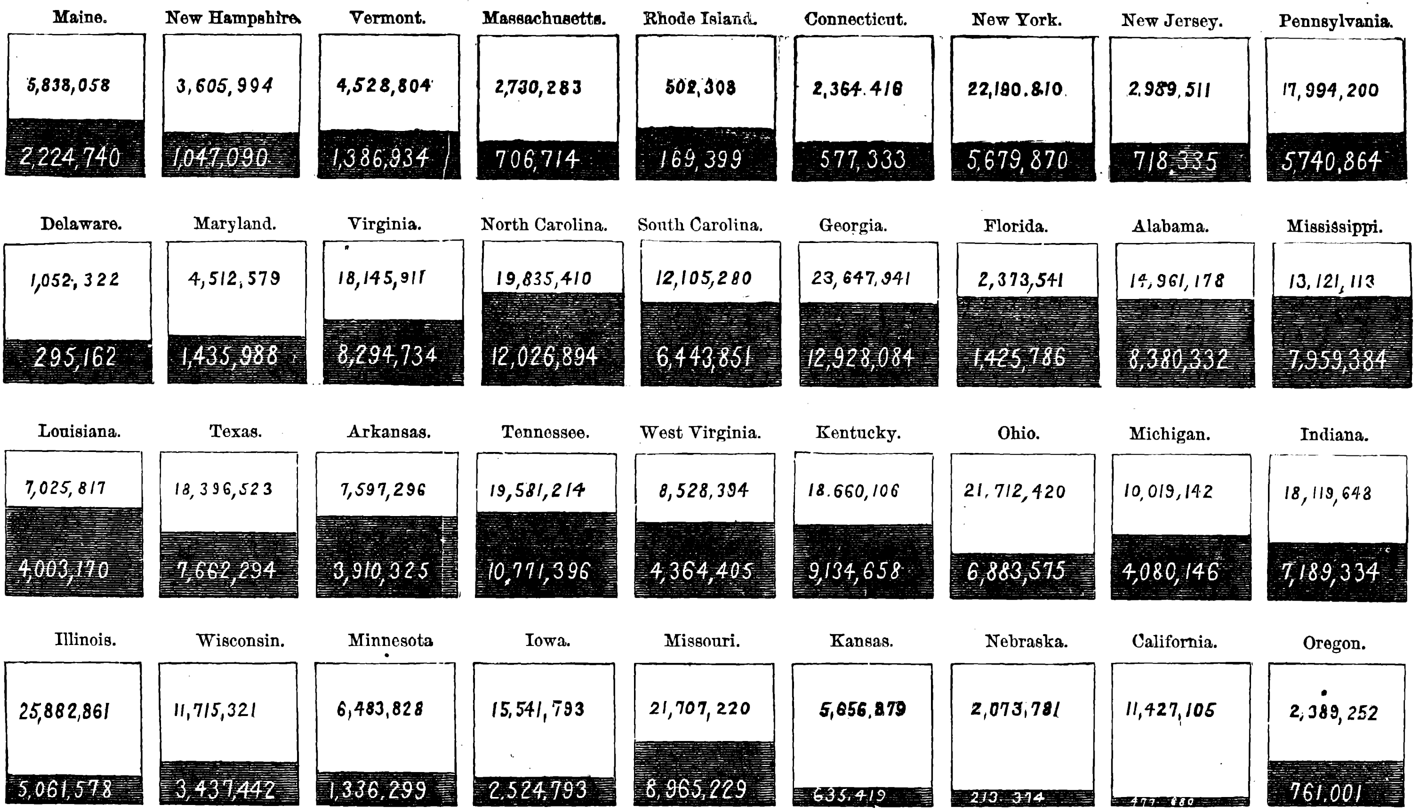
Forestry has excited much attention in the United States in recent years, in consequence of the rapid deforesting of large areas, and the expression of fears of a timber famine at no distant day. That the great white-pine forests are being rapidly despoiled of their original growth, and that inroads are being made upon the heavy timber of the Sierra slopes and deep valleys, there can be no question; and yet, there is much that is sensational and extravagant in the views of alarmists on this subject. The pine forests are only culled, and are left to produce supplies for another generation; the western slopes of the Sierras are prolific of new growths in place of the old, and, except in the vicinity of the Central Pacific Road, are almost untouched by the woodman's ax, as also are the immense forests of Washington Territory and Oregon. More than half the entire area of the South is woodland, and the requirements of its present population, year by year, do not equal half the annual increase by growth. A large portion of the present consumption is sheer waste in clearing lands for agricultural purposes. Were the more than 200,000,000 acres of woodland in the South cut off at once, the annual growth upon the denuded area would be little less than 200,000,000 cords of wood per annum. Yet it is true that the heavy timber of "original" growths is gradually disappearing.

As population increases, and manufacturing operations are extended, timber will, of course, become scarcer, and consequently dearer, rendering remunerative judicious effort and expenditure in forest-culture. But our people will ultimately learn that we can produce our wood and timber supplies as surely and profitably, though not with so frequent harvests, as we can grow our grain or meat supply.

It is not our purpose to discuss the general subject of forestry here, but to collate the records of this and other Departments of the Government upon forest statistics, with current experimental data from other sources, to supply the want of investigators for the main facts of forest-growing.

In the first place, it is proper to inquire how our forest-area compares

PLATE XXVII.



FOREST AREA OF THE UNITED STATES.

with that of other countries. The first and only attempt to separate unimproved farm-lands of the census into "woodlands" and "other unimproved land" was made in 1870, General Walker consenting to strain the old law a little by such enlargement of the schedule, at the urgent request of the statistician of this Department. It is certainly one of the easiest returns to make in all the agricultural schedules, as every man knows the area of his woodland far better than he can estimate the quantity of crops grown the previous year and already consumed, without measuring. While some portions of the farm-areas are doubtless unreported in the several States, making the land in farms appear less than it actually is, there is no reason why the proportion of such class should not be given with approximate accuracy. The area reported in woodland is, therefore, not in excess of the actual area.

But a large proportion of the area of several of the States is not in farms—even in one of the New England States the farm-area is little more than a fourth of the surface of the State—therefore a large addition to census figures will be necessary in estimates of aggregate areas.

According to the census-returns, 39 per cent. of farms in the several States—exclusive of Territories—is in woodland. Taking into consideration the entire area of States, water-surface, cities, highways, &c., the estimate of the statistical division of this Department is 29; including all the Territories, 25 per cent. This places the United States below Norway, Sweden, Russia, and Germany, and above all other European states, in the proportion of forests. The German writer, Reutzsh, gives the following figures:

	Per cent.	Acres per head of population.		Per cent.	Acres per head of population.
Norway	66	24.61	Sardinia	12.29	0.223
Sweden	60	8.55	Naples	9.43	0.138
Russia	30.90	4.28	Holland	7.10	0.12
Germany	26.58	0.663	Spain	5.52	0.291
Belgium	18.52	0.186	Denmark	5.50	0.22
France	16.79	0.376	Great Britain	5	0.1
Switzerland	15	0.396	Portugal	4.40	0.182

The accompanying diagram will illustrate the proportion of forest area of farm-lands in the several states, the figures in the white portion of the squares representing the farm-area in acres, and those in the shaded portion the proportion of that area in forest, in each State respectively. In some of the States the farm-lands comprise nearly the entire area, exclusive of lakes and streams; in others, those more recently settled, and also some of the original thirteen, the unoccupied or wild lands constitute a considerable proportion of the whole area. Thus Maine has 5,835,058 acres in farms, while her area includes 22,400,000 acres of land and water. In the table following, an estimate of the forest area, outside of that belonging to farms, is added to the total acreage of farm woodlands, to make the estimated total area in forest. In estimating the proportion in woodland, the water-surface on lakes and streams, the prairie, the ledges and other wastes incapable of producing trees, must be taken into consideration. After canvassing the facts affecting this proportion in the several States of the area exclusive of farms, one-half was assumed to be in forest in Maine, New Hampshire, Vermont, Pennsylvania, Maryland, Kentucky, Missouri,

Michigan, Florida; six-tenths were taken for Arkansas, Virginia, West Virginia, and Louisiana; seven-tenths for North Carolina, South Carolina, Georgia, Alabama, Mississippi, and Tennessee; one-third was taken for Massachusetts, New York, and New Jersey; one-fourth for Texas and Oregon; one-sixth for Wisconsin and Minnesota; one-eighth for Iowa; one-tenth for Rhode Island, Connecticut, Ohio, Indiana, and Illinois; one-twelfth for California; one-twentieth for Kansas, Nebraska, and Nevada.* The proportion assumed respectively for the Territories is: Washington, 33 per cent.; Montana, 16; Idaho, 15; Utah, 10; Wyoming and Indian, 8; New Mexico and Arizona, 6; Dakota, 3. The result of adding this outside forest to that of the farm-lands is given in the following table, which shows the percentage of forest area of States and Territories (second column) in comparison with the census percentage, which includes only the official enumeration of farms:

States.	Percentage in farms.	Total percentage.	States.	Percentage in farms.	Total percentage.
Maine	38.1	46.9	Indiana	39.6	34.8
New Hampshire	29	37.2	Illinois	19.6	16.9
Vermont	30.6	36.5	Wisconsin	29.3	20.9
Massachusetts	25.8	29.2	Minnesota	20.6	17.1
Rhode Island	33.7	24.2	Iowa	16.2	14.1
Connecticut	24.4	21.2	Missouri	41.3	45.4
New York	25.5	27.6	Kansas	11.2	5.6
New Jersey	24	28.1	Nebraska	10.2	5.2
Pennsylvania	31.9	38.9	California	4.1	7.9
Delaware	28	29.2	Oregon	31.8	25.2
Maryland	31.8	38.4	Nevada	6.4	5
Virginia	45.7	49.4			
North Carolina	60.6	64.2	TERRITORIES.		
South Carolina	53.2	60.6			
Georgia	54.6	60.2			
Florida	60	50.6	Colorado	3.5	10
Alabama	56	63.5	Utah	0.1	10
Mississippi	60.6	65.9	New Mexico	12.7	6
Louisiana	56.9	59.1	Washington	44.8	33
Texas	41.6	26.7	Dakota	7.4	3
Arkansas	51.4	58	Montana	0.8	16
Tennessee	55	59.9	Idaho	9.6	15
West Virginia	51.1	54.9	Arizona	....	6
Kentucky	48.9	49.1	Wyoming	0.8	8
Ohio	31.7	28.4	Indian	....	8
Michigan	40.7	47.1	Alaska	....	30

The census percentage is increased in some States, and diminished in others, according to circumstances. In Maine scarcely more than one-fourth of the area is in farms; the remaining land being covered, generally, with forest growths, though culled of valuable timber, increases the census percentage from 38.1 to 46.9, and the increase would be much greater (than the estimated proportion of one-half) but for the remarkable extent of water-surface in addition to barren ledges and other wastes. Rhode Island, on the contrary, has 502,308 acres in farms, of its 835,840—so large a proportion of the whole that nine-tenths of the remainder, 333,532 acres, are assumed to be water, rock, roads, &c., thus reducing the percentage of total area in forest from 33.7 to 24.2. New York has nearly two-thirds of its area in farms, and so much water throughout the State, especially the lakes of the western and northern sections, that only one-third of its 7,889,190 acres in farms is assumed to be in forest. Florida, though having less than one-tenth of its area in farms, has so large a proportion of water area that it is not deemed safe to estimate more than

* This estimate has been strikingly verified in Kansas, the State census making the actual area in forest five per cent. of the surface, or "one-twentieth."

half the unoccupied surface in woods, which reduces the census percentage 60 to 50.6. Ohio has its available area nearly all occupied by farms, and its percentage is therefore reduced from 31.7 to 28.4. The amended percentage, if the estimates are accurate, must be the true proportion for the entire State, and it is undoubtedly nearer the actual percentage than the figures representing only farm-lands.

The following table presents a statement of the area in farms, that outside of farms, the total area, and the forest acreage in farms alone and in the entire area of each State and Territory:

States and Territories.	No. acres in farms.	No. acres not in farms.	No. acres in total area.	No. acres of woodland in farms.	Estimated total area in woodland.
STATES.					
Maine	5, 838, 058	16, 561, 942	22, 400, 000	2, 224, 740	10, 505, 711
New Hampshire	3, 605, 994	2, 333, 206	5, 939, 200	1, 047, 090	2, 213, 693
Vermont	4, 528, 804	2, 006, 876	6, 535, 680	1, 386, 934	2, 390, 372
Massachusetts	2, 730, 283	2, 261, 771	4, 992, 000	706, 714	1, 460, 619
Rhode Island	502, 308	333, 532	835, 840	169, 399	202, 752
Connecticut	2, 364, 416	675, 584	3, 040, 000	577, 333	644, 891
New York	22, 190, 810	7, 889, 190	30, 080, 000	5, 679, 870	8, 309, 600
New Jersey	2, 989, 511	2, 335, 289	5, 324, 800	718, 335	1, 496, 764
Pennsylvania	17, 994, 200	11, 445, 800	29, 440, 000	5, 740, 864	11, 463, 764
Delaware	1, 052, 322	304, 478	1, 356, 800	295, 162	396, 654
Maryland	4, 512, 579	2, 606, 781	7, 119, 360	1, 435, 988	2, 739, 378
Virginia	18, 145, 911	6, 399, 369	24, 545, 280	8, 294, 734	12, 134, 355
North Carolina	19, 835, 410	12, 615, 150	32, 450, 560	12, 026, 894	20, 857, 499
South Carolina	12, 105, 280	9, 654, 720	21, 760, 000	6, 443, 851	13, 202, 155
Georgia	23, 647, 941	13, 472, 059	37, 120, 000	12, 928, 084	22, 358, 525
Florida	2, 373, 541	35, 557, 979	37, 931, 520	1, 425, 786	19, 204, 775
Alabama	14, 961, 178	17, 500, 902	32, 462, 080	8, 380, 332	20, 630, 963
Mississippi	13, 121, 113	17, 058, 727	30, 179, 840	7, 959, 384	19, 900, 492
Louisiana	7, 025, 817	19, 435, 623	26, 461, 440	4, 003, 170	15, 664, 543
Texas	18, 396, 523	157, 191, 317	175, 587, 840	7, 662, 294	46, 960, 123
Arkansas	7, 597, 296	25, 809, 424	33, 406, 720	3, 910, 325	19, 390, 579
Tennessee	19, 581, 214	9, 602, 786	29, 184, 000	10, 771, 396	17, 493, 346
West Virginia	8, 528, 394	6, 191, 606	14, 720, 000	4, 364, 405	8, 089, 368
Kentucky	18, 660, 106	5, 455, 094	24, 115, 200	9, 134, 658	11, 862, 205
Ohio	21, 712, 420	3, 864, 540	25, 576, 960	6, 883, 575	7, 270, 029
Michigan	10, 019, 142	26, 109, 498	36, 128, 640	4, 080, 146	17, 134, 895
Indiana	18, 119, 648	3, 518, 112	21, 637, 760	7, 189, 334	7, 541, 145
Illinois	25, 882, 861	9, 579, 539	35, 462, 400	5, 061, 578	6, 019, 531
Wisconsin	11, 715, 321	22, 796, 039	34, 511, 360	3, 437, 442	7, 236, 781
Minnesota	6, 483, 828	46, 976, 012	53, 459, 840	1, 336, 299	9, 165, 634
Iowa	15, 541, 793	19, 687, 007	35, 228, 800	2, 524, 793	4, 985, 668
Missouri	21, 707, 220	20, 116, 780	41, 824, 000	8, 965, 229	19, 023, 619
Kansas	5, 656, 879	46, 386, 641	52, 043, 520	635, 419	2, 954, 751
Nebraska	2, 073, 781	46, 563, 019	48, 636, 800	213, 374	2, 541, 524
California	11, 427, 105	109, 520, 735	120, 947, 840	477, 880	9, 604, 607
Oregon	2, 389, 252	58, 586, 108	60, 975, 360	761, 001	15, 407, 528
Nevada	208, 510	71, 529, 090	71, 737, 600	13, 415	3, 589, 869
Total of States	405, 226, 769	869, 932, 271	1, 275, 159, 040	158, 867, 227	402, 048, 717
TERRITORIES.					
Colorado	320, 346	66, 559, 654	66, 880, 000	11, 504	6, 667, 469
Utah	148, 361	53, 916, 682	54, 065, 043	215	5, 391, 883
New Mexico	833, 549	76, 735, 091	77, 568, 640	106, 283	4, 710, 388
Washington	649, 139	44, 147, 021	44, 796, 160	291, 206	14, 859, 722
Dakota	302, 376	96, 293, 752	96, 596, 128	22, 605	2, 911, 417
Montana	139, 537	91, 877, 103	92, 016, 640	1, 198	14, 701, 534
Idaho	77, 139	55, 151, 021	55, 228, 160	7, 476	8, 280, 129
Arizona	21, 807	72, 884, 433	72, 906, 240	....	4, 373, 065
Wyoming	4, 341	62, 640, 727	62, 645, 068	35	5, 011, 293
Indian	....	44, 154, 240	44, 154, 240	....	3, 532, 339
Alaska	....	369, 529, 600	369, 529, 600	....	110, 858, 880
Total of Territories	2, 496, 595	1, 033, 889, 324	1, 036, 385, 919	440, 522	181, 298, 119
Grand total	407, 723, 364	1, 903, 821, 595	2, 311, 544, 959	159, 307, 749	583, 346, 836

Taking into consideration only the farm-lands, the proportion of woodlands is smallest in California, being 4.1 per cent. In order, respectively, follow Nevada, 6.4 per cent.; Nebraska, 10.2; Kansas, 11.2; Iowa, 16.2;

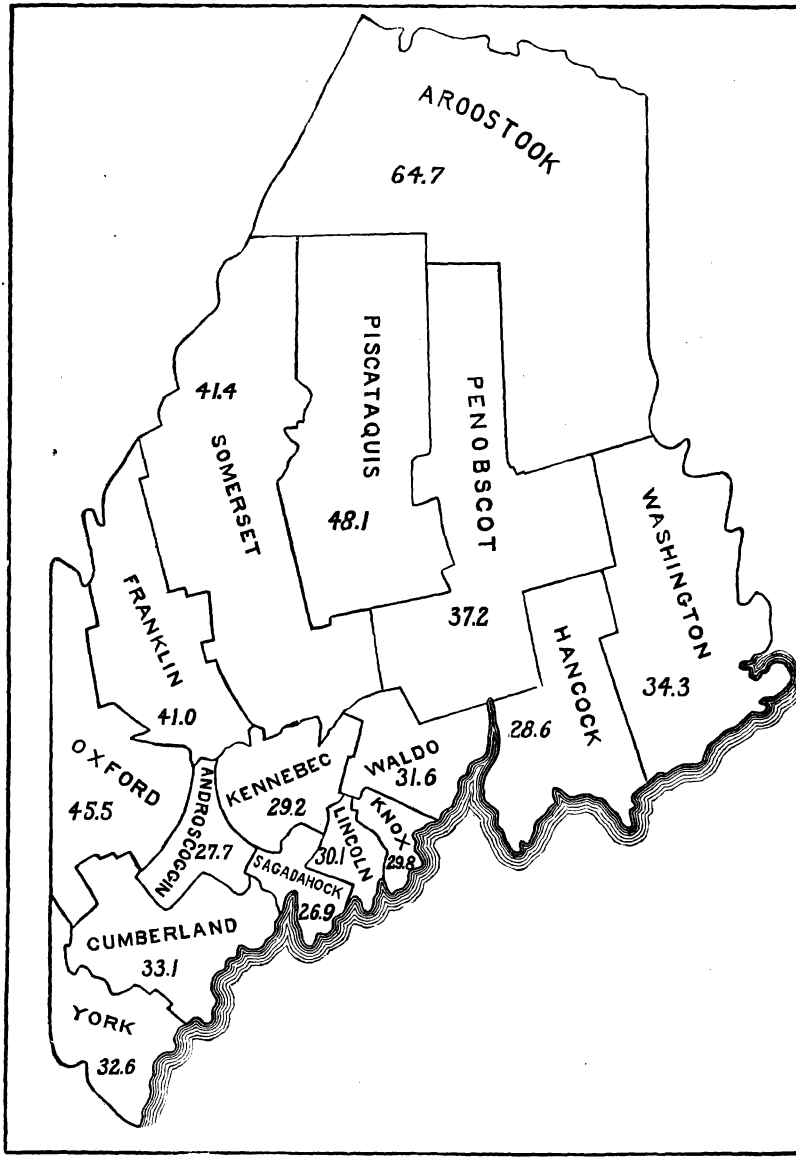
Illinois, 19.6. The proportion increases, State by State, from the Pacific coast eastward to Indiana, (39.6 per cent.;) and then comes the devastation of the ax, which reduces the percentage of Ohio, a region originally forest with the exception of small patches of prairie mainly about the head-waters of the Miami, to 31.7 per cent. Pennsylvania has about the same proportion, or 31.9, and New Jersey 24 per cent.

There are only two other Western States that have percentages between 20 and 30, viz, Minnesota, 20.6; Wisconsin, 29.3. The Eastern States (besides New Jersey) which come within the same limits, are Connecticut, 24.4; New York, 25.5; Massachusetts, 25.8; Delaware, 28; New Hampshire, 29; Vermont, 30.6. Those having between 30 and 40 per cent. of this farm area in forest are: Pennsylvania, Indiana, named above; Oregon, 31.8; Maryland, 31.8; Rhode Island, 33.7; Maine, 38.1. The States having between four and five tenths of their farm-lands in forest are three: Michigan, 40.7; Texas, (the eastern portion generally wooded,) 41.6; Virginia, 45.7. The southern belt is the most heavily wooded portion of the country, all the States, with the exception of Virginia and Texas, having more than half of their farm-areas in woodland, and a larger portion still if the wooded wild lands should be counted in with the farm-lands. The proportion in the occupied or farm areas is as follows: West Virginia, 51.1; Arkansas, 51.4; South Carolina, 53.2; Georgia, 54.6; Tennessee, 55; Alabama, 56; Florida, 60; North Carolina and Mississippi, each 60.6 per cent.

The Territories have only a very small portion of their respective areas in farms. Here and there a small survey has been made near some town, along some stream, or in the neighborhood of mining operations. The areas in wood are mainly among the mountains, the most heavily wooded on northern slopes and in the gorges protected from the winds; the proportion given for farm-lands is therefore, in all probability, less than the real portion for the entire area of a Territory, notwithstanding the fact that available woodlands in surveyed tracts are rapidly taken up by farmers. Utah, one-tenth of one per cent.; Montana and Wyoming, eight-tenths of one per cent.; Colorado, 3.5; Dakota, 7.4; Idaho, 9.6; New Mexico, 12.7; Washington, 44.8.

Most of the States, in their several counties, exhibit great diversity in the abundance of their wood and timber supplies. In the new States it is due to the existence of prairies, or treeless plains, traversed by streams shaded by a line of forest, which characterize the surface of all or of a portion of a State; in the older States it is simply the result of settlement and cultivation, in the destruction of forests by clearing land for farms, for supplies of wood for fuel, in obtaining timber for building, and for the various uses of mechanism. East of the Alleghanies almost the entire surface of the land was originally in forest. On the very summit of the Alleghanies are comparatively large tracts of level meadows or mountain prairies, known as "glades," which are found in undrained soils not suited to the growth of trees, though this mountain-chain is generally wooded on slope and summit, with an arborescent growth, original and undisturbed, various and vigorous as could be desired. West of the mountains, through West Virginia, Ohio, and Kentucky, there was little else than forest in the times of the aborigines; and in Northeastern, Southern, and Southwestern Indiana, a wooded surface was the prevailing characteristic, and even now it is a favorite resort for obtaining black walnuts and poplars of enormous size, and great boles of oaks, fit for the masts of many a "man-of-war." The South was, and is, a wooded region, with very few and small prairies in the valley of the Mississippi, and none really worth mentioning,

PLATE XXVIII



MAINE.

until Central Texas is reached. In Northern Missouri are extensive prairies, but almost half the area of the State is now covered with forest, notwithstanding the extensive clearing of farm-lands during more than fifty years since its settlement; and more than half the surface of Arkansas and Louisiana, both west of the Mississippi, is now covered with wood. Meteorological records show that the lines of equal moisture in this section run northeast and southwest, through Western Kansas, Eastern Nebraska, Iowa, and Wisconsin; the records of the rain-fall of any given period correspond on that line, rather than with a line through Kansas and Missouri; so the rains of Central Nebraska and Minnesota, in point of time and quantity, correspond more nearly than those of Nebraska and Iowa. As might naturally be expected, we find the forest boundary from Texas to Illinois, beyond which the prairies stretch westward, running in a general direction corresponding with the lines of equal rain-fall. As a result, (though the lack of trees farther west cannot be attributed to insufficient rain-fall alone,) we find plains predominating in Western Texas, in nearly all of the Indian Territory, in a strip of Western and nearly all of Northern Missouri, in a large portion of Illinois, and in Western and Northern Indiana, nearly to Lake Erie. Southern Illinois has an average proportion of forest.

RECENT OFFICIAL INVESTIGATION.

The statistical correspondents of this Department have recently made returns in response to an official circular, relative to local resources in wood and timber, the species most abundant, condition of forests, rate of growth, home prices of wood and lumber, and other practical points. These statements have been generally well considered, and though occasional erroneous estimates may have been made, they contain a mass of information more accurate and complete than is elsewhere obtainable, the substance of which is presented with as little change of form as is consistent with a decent regard for brevity.

In connection with these notes are presented the census figures for the forest-area in farms, with outline maps, showing in plain figures the percentage of such area for each county.

These returns indicate an active utilization of forest-products in New England and in the Middle States. In all this section, where there is found the most limited water-power sufficient to work effective machinery, are located mills and shops for working up all kinds and sizes of both soft and hard wood. In many localities these little manufactories afford a market, at a price which, while it enhances fire-wood, keeps in advance of it for every variety of tree that has obtained the diameter of a hoop-pole, or walking-stick, and every part that is large enough to make a spool, dowel, match, shoe-peg, or pulp for paper. The principal varieties which prevail to a greater or less extent in these States are white and yellow pine, hemlock, spruce, fir, tamarack or hackmatack, oak, birch, ash, and walnut of all kinds, except that black walnut is scarcely found east of the Hudson; varieties of beech, maple, and poplar, and basswood or linden. The unculled, primeval white-pine forests, which once covered large portions of the New England States, are now chiefly confined to tracts in Aroostook and the northern parts of adjoining counties in Maine.

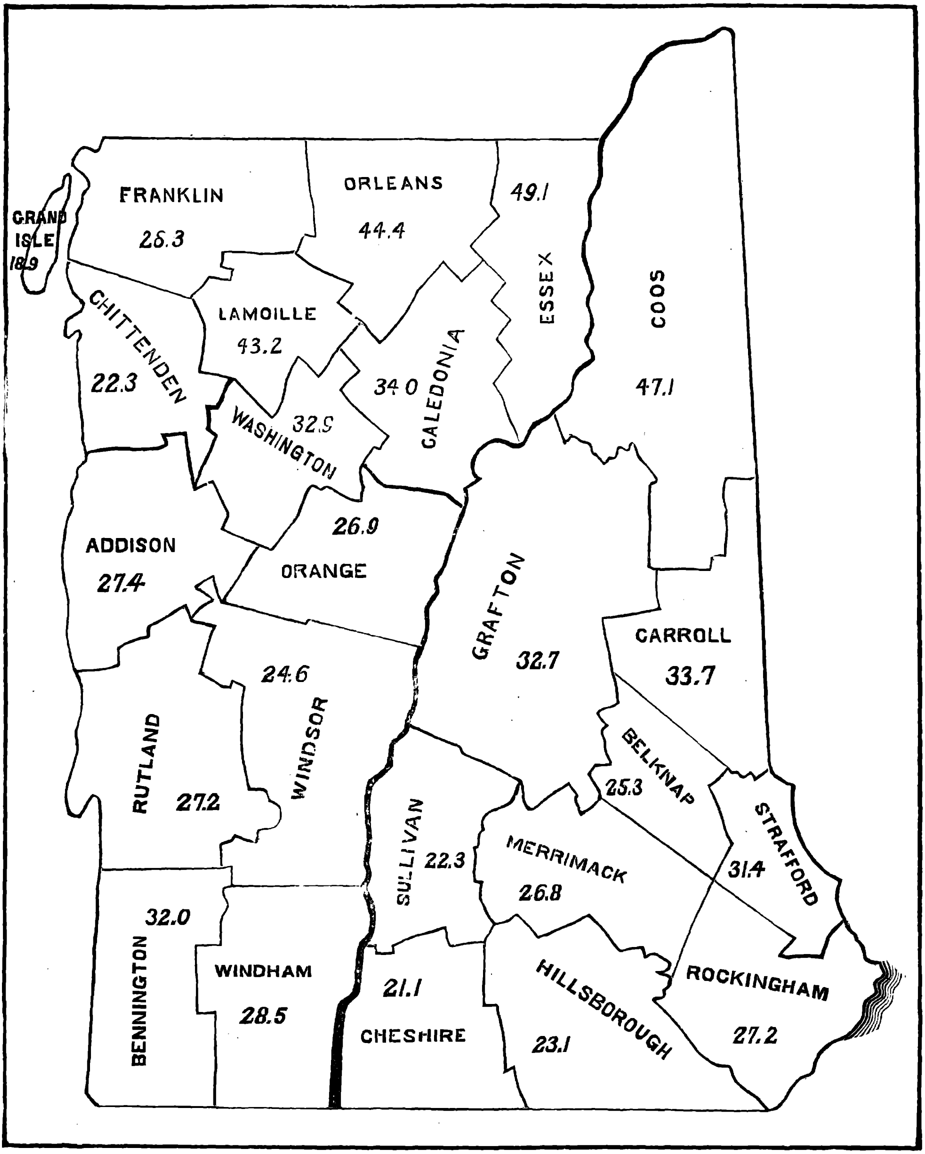
MAINE.—The pine timber has been shipped from the northern half of *Penobscot* until there is not enough left for home consumption. In the home-market, clear pine lumber is \$20 to \$30 per M; hemlock, \$8 to \$10; bass, \$15; spruce, \$15 to \$20; cedar shingles, \$2.50 to \$3.50. Wood

land averages in value $12.50, and in yield 20 cords per acre. In *Franklin*, large tracts of timber are yet left, and while the best woodland yields 40 cords per acre, the average is about 25. In *Sagadahoc* and *Hancock* the average yield of woodland is 30 cords per acre; in the former, the average cash value of forests is $50 per acre, and the best pine-lands yield 30 M of lumber per acre; in the latter, the moisture of the climate favors a rapid growth, yielding 25 to 30 cords per acre every twenty-five years. The second growth is principally soft wood, and finds a ready market at the lime-kilns at $3 to $5 per cord. *York* and *Cumberland* report an average yield of 40 cords per acre. In York, it is claimed that although the first, and in many instances the second, crop of white pine has been cut off, yet there are more acres of the same now growing than in any other county of the State. The quantity has been increasing for the last thirty years. It is estimated that a forest of fifty years' growth averages 40 M, and is worth $250 per acre; of seventy years, 70 M per acre, worth $500 on the stump. Young pines, started within ten years, cover thousands of acres. About half the forest-land is young growth. Hard wood, in market, brings $4 per cord. In Cumberland, the average value of forests, reckoned as woodland, is $80 per acre, or $2 per cord on the stump; timber-land, $120 per acre. Poplar is used extensively for staves and paper-pulp, and birch and maple for lasts, shoe-pegs, bobbins, spools, etc. The forests in *Lincoln* are almost entirely second growth, and valued at an average of $12 per acre. The northern half of *Oxford* is still little else than forest, and mostly original growth, consisting principally of pine and spruce. The southern portion is reported as more than half covered with forests, principally of second growth, consisting largely of poplar, white birch, ash, and maple. The poplar and white birch, used for salt-boxes, staves, paper-pulp, spools, clothes-pins, etc., sell for $1 per cord, standing. The census-returns of forest-area in farms, by counties, is as follows:

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Androscoggin	68,172	27.7	Penobscot	243,661	37.2
Aroostook	277,613	64.7	Piscataquis	130,105	48.1
Cumberland	135,917	33.1	Sagadahoc	31,570	26.9
Franklin	159,954	41.0	Somerset	241,046	41.4
Hancock	73,912	28.6	Waldo	122,874	31.6
Kenebec	134,993	29.2	Washington	89,717	34.3
Knox	39,542	20.8	York	138,343	32.6
Lincoln	66,057	30.1			
Oxford	271,264	45.5	Total	2,224,740	38.1

NEW HAMPSHIRE.—The average yield of woodland per acre in *Belknap* is estimated at 20 cords, *Carroll* and *Cheshire* at 30, and *Sullivan* at 40. In Carroll the old growth of pine has become scarce, selling at $20 per M, while hemlock sells at $5. On the stump wood is worth $1 per cord in Belknap; pine timber, $8 per M. The best forests in Sullivan yield 60 cords per acre, mostly hard wood, worth standing $1 per cord, and 25 M of soft lumber. On the stump hemlock timber is worth $2.50 per M; spruce, $5. A large proportion of the forests in Cheshire are second growth. Wood in market is worth $4 to $6 per cord. While rock-maple brings $6 per cord for wood, it brings $8 for chair-stuff, and poplar the same for paper-manufacture. Many acres of spruce forest in *Grafton* are valued at $1,000 per acre, and many of hemlock at $500. Large tracts of birch, for peg-wood, and of poplar for paper-pulp, sell at an average of $20 per acre. It is estimated that the forests of the county average in value $50 per acre, and that the annual growth fully equals

PLATE XXIX.



NEW HAMPSHIRE AND VERMONT.

the consumption. Many old farms, once cultivated, are now forsaken and growing up to wood and timber. The official record* of area reads:

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Belknap	53, 544	25. 3	Merrimack	124, 211	26. 8
Carroll	151, 164	33. 7	Rockingham	97, 105	27. 2
Cheshire	72, 073	21. 1	Strafford	40, 739	31. 4
Coos	112, 529	47. 1	Sullivan	64, 332	22. 3
Grafton	230, 309	32. 7			
Hillsborough	92, 084	23. 1	Total	1, 047, 090	29. 0

VERMONT.—From the forests in *Franklin* the pine has been mainly culled out, but hemlock still abounds. The lumber is worth $8 to $10 per M, and the bark $5 to $6 per cord. Basswood and ash lumber bring $10 to $20 per M. Spruce is used largely for manufacturing butter-tubs, many of which are shipped West. On nearly all the farms are orchards of sugar-maple, ranging from 100 to 1,000 trees. These orchards are often held at a higher value than other land covered with hard-wood timber, or land under cultivation. The forests yield 25 to 50 cords of wood per acre, worth in market $3 to $4 per cord. It is thought that the demands of the railroads will soon result in a scarcity of wood and timber, unless measures be taken to encourage a new growth. The forests in *Chittenden* are principally second growth. There are some large tracts of cedar. Hemlock bark is plentiful and in demand. In *Essex* much of the original forest is left. It is estimated that some tracts of hemlock and spruce yield 75 M per acre, while the average for the forests is 25 to 30 M, and the wood of some forests 200 cords. The forests in *Orleans* are nearly all of the original growth. The hills are covered chiefly with hard wood, which in some instances is nearly all sugar-maple, the trees being 1 to 2½ feet in diameter and 60 to 120 feet high. Land having 50 to 100 trees for tapping is worth as much as cleared land, $15 to $25 per acre. Tracts on which red birch, beech, or ash are in excess will yield 50 cords per acre. From about 10 acres, 69 cords of bark were recently peeled, which sold at $7 per cord. Cedar posts, for fences, sell for 6 to 7 cents each; cedar rails, 7 to 8 cents. Spruce is largely manufactured into clapboards and butter-tubs, the latter being shipped West by the car-load. A chair-factory uses several thousand birch and maple logs. Though lumber is being constantly cut to order for New England cities, there is no scarcity, and at present prices money is made slowly in working it up. About 50 per cent. of the forest-lands in *Lamoille* produce chiefly soft timber. These lands sell at $5 to $20 per acre, according to location and value of soil. This timber is sold in logs at the mills at $6 to $7 per M. The other half is made up principally of hard-wood varieties, among which the most valuable is the sugar-maple, from which large quantities of sugar are made, and sold at 10 to 15 cents per pound. Maple-orchards sell at $100 to $200 per acre. Ash lumber sells at $15 to $30 per M. All kinds of timber, except sugar-maple, are being cut off to an alarming extent, though bringing the owner scarcely anything except low wages for cutting and hauling. Railroads and manufacturing establishments are fast stripping *Caledonia* of timber. Except on the mountains, good woodland sells for $100 per acre. There is a large area covered with sugar-maple, which is the most valuable, except a few scattered lots of white pine. At the railroad-stations, pine lumber is

*In all of the subsequent tables of area interspersed in this record of local statistics the figures must be held to mean only farm area, and not to include tracts of wild lands not connected with any cultivated lands.

worth $10 to $40 per M; hemlock, $10; spruce, $13; maple, $12 to $24; birch, $15 to $30.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Addison	108, 990	27. 4	Orange	107, 951	26. 9
Bennington	61, 079	32. 0	Orleans	157, 449	44. 4
Caledonia	122, 061	34. 0	Rutland	120, 238	27. 2
Chittenden	64, 970	22. 3	Washington	118, 403	32. 9
Essex	68, 025	49. 1	Windham	123, 886	28. 5
Franklin	112, 794	28. 3	Windsor	130, 657	24. 6
Grand Isle	8, 889	18. 9			
Lamoille	81, 542	43. 2	Total	1, 386, 934	30. 6

MASSACHUSETTS.—In *Berkshire* scarcely a vestige of the original forest is left, even on the mountain-tops, owing to the demands of manufactories and railroads. Nearly all lumber for building is now brought from Michigan, Northern Vermont, and Canada. An immense sum is thus expended for timber, which, it is claimed, with proper attention could be produced at home, and that with advantage to agriculture. It is stated that in the hill-towns farms can be bought for $8 to $10 per acre, with wood enough now growing to pay for them at 50 cents per cord. In *Dukes*, most of the timber, principally oak, has been cut off, but there is considerable forest yielding wood at the rate of 15 to 25 cords per acre, which is worth $5 per cord in the woods. Some attention has been given to raising northern pines, with promising results. A lot from seed sown on light waste-land some twenty years ago would now yield 20 cords per acre. Since the introduction of coal into *Bristol*, the forest-area has increased 15 to 25 per cent. Pine, oak, and white birch are the principal kinds. The best growths of pine are worth $200 per acre. The logs are largely sawed into "box-boards," 4 to 6 feet in length, the refuse of the same being sawed into staves for nail-kegs. In a few instances old fields have been set out with pine plants of two or three years' growth, some of which have now attained a height of 30 to 40 feet. Thus far, in most cases, the results have proved the investment judicious. *Suffolk* reports only about 50 acres in woodland, and that of very small growth.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Barnstable	15, 561	56. 6	Middlesex	79, 131	28. 5
Berkshire	93, 140	24. 1	Nantucket	168, 000	1. 6
Bristol	72, 851	44. 0	Norfolk	40, 508	37. 9
Dukes	2, 842	15. 9	Plymouth	57, 838	49. 1
Essex	36, 361	22. 1	Suffolk	379, 000	8. 8
Franklin	67, 260	20. 5	Worcester	125, 848	22. 1
Hampden	59, 247	22. 3			
Hampshire	55, 580	18. 9	Total	706, 714	25. 8

RHODE ISLAND.—There are about 200 acres of forest in *Bristol* on which the oak and walnut timber is worth, standing, $75 per acre. Wood, standing, is worth $4 per cord. In *Washington* the forests yield about 30 cords per acre, worth, standing, $1 to $2 per cord.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Bristol	1, 809	14. 8	Washington	50, 150	33. 5
Kent	36, 921	41. 2	Total	169, 399	33. 7
Newport	7, 980	13. 2			
Providence	72, 539	37. 9			

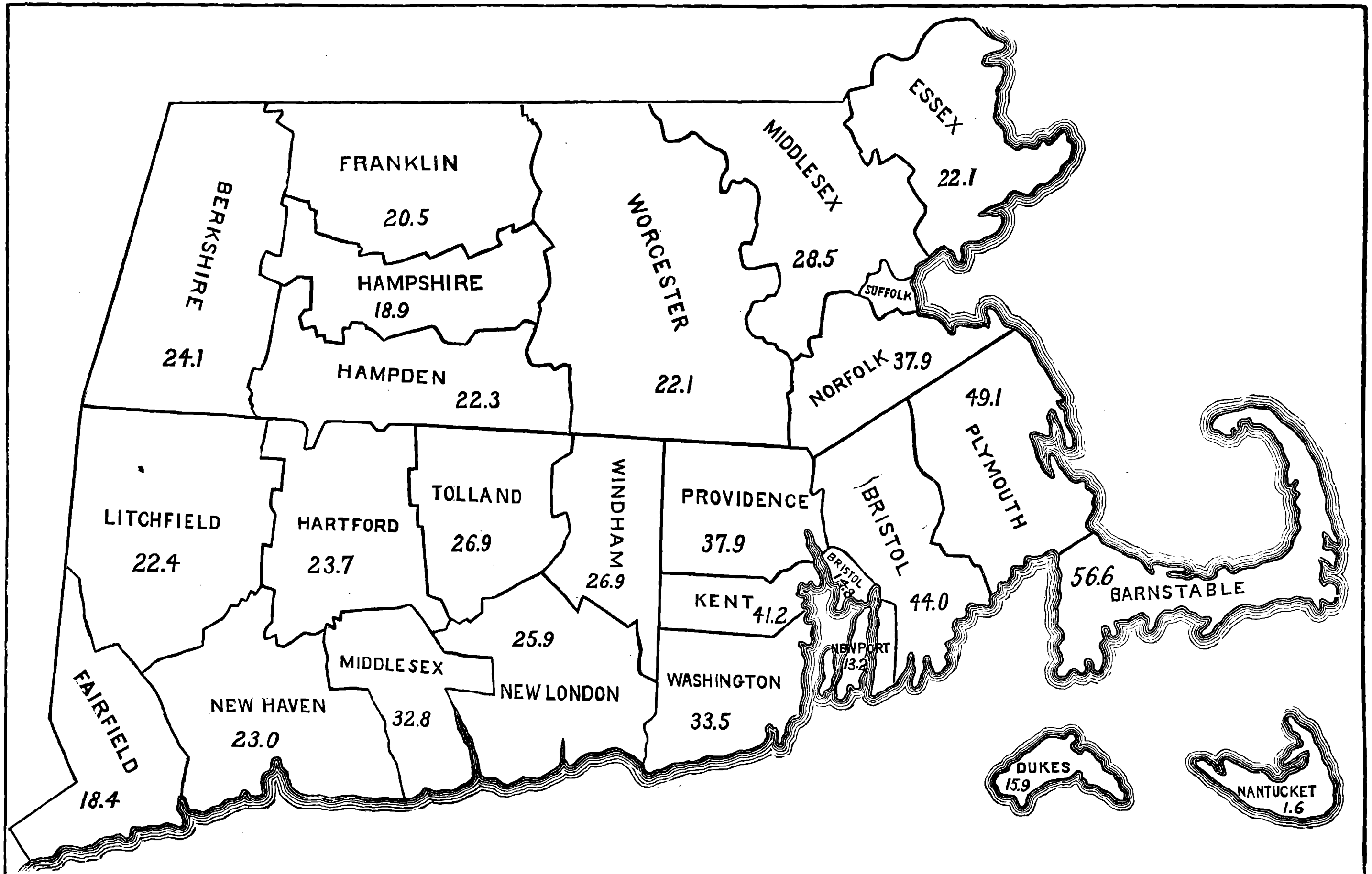


PLATE XXX.

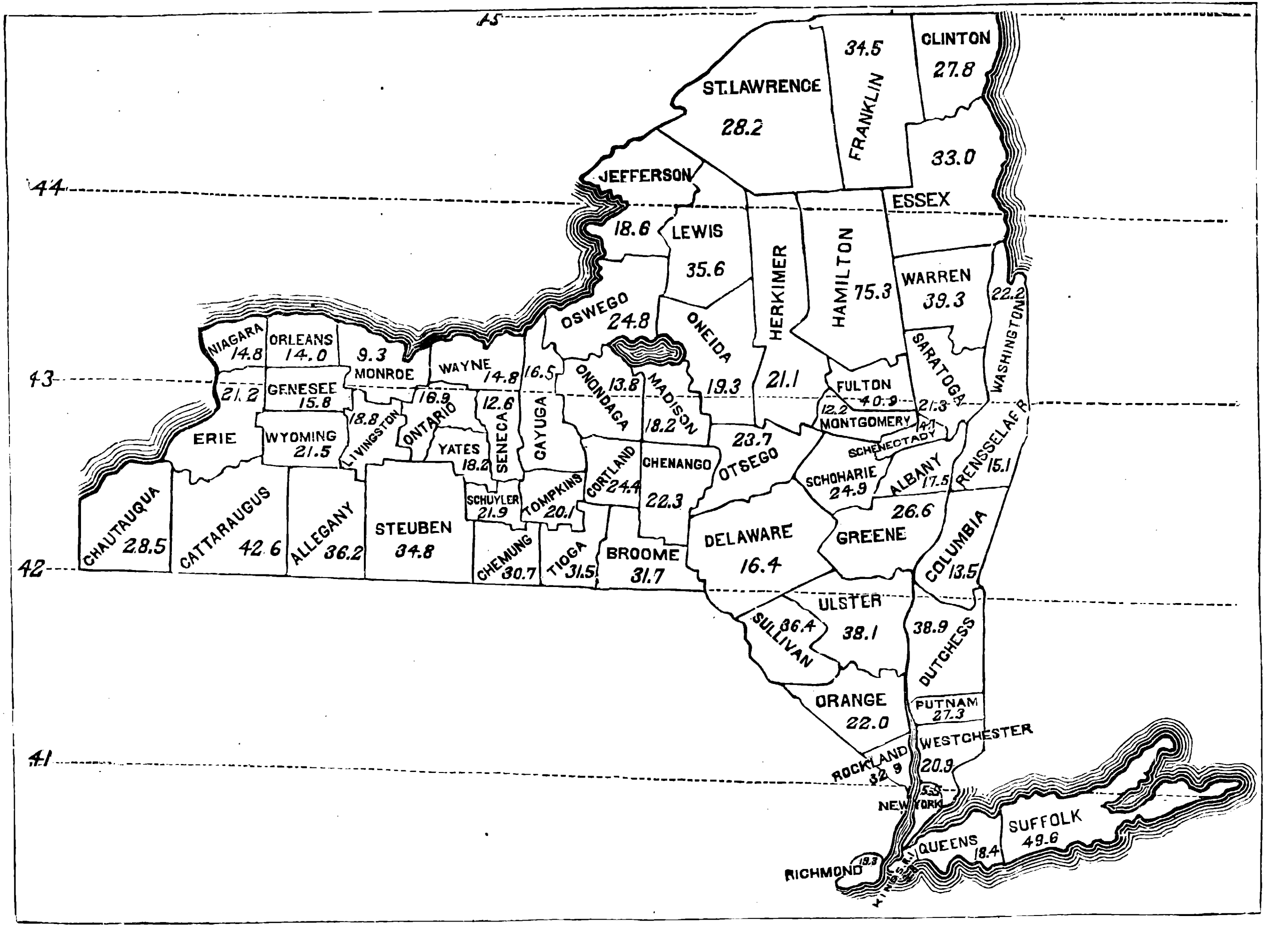
MASSACHUSETTS, RHODE ISLAND, AND CONNECTICUT.

CONNECTICUT.—Within the last ten years the heaviest forests in *Windham* have been cut. A few tracts are left which will yield 50 to 75 cords per acre, worth $1 to $1.50 per cord, but most of the forest-area is sprout-land, and land too rocky or sterile to cultivate. From the latter a crop of white birches and alders is taken, for wood, once in twenty-five or thirty years. On about one-fourth of the forest-area pines and chestnut grow, and so rapidly that in twenty to thirty years they will make boards 12 to 18 inches wide. The average annual growth of wood per acre is estimated at one cord. Land on which timber is growing thriftily increases in market-value every year. *New London* reports that timber is being cut faster than it grows, and estimates the yield at the following extravagant rates: Chestnut tracts, 90 M per acre, worth $25 per M; chestnut-shingles, $4.75 per thousand; railroad-ties, 40 cents each: oak tracts, 55 to 60 M per acre, worth $35 per M; hemlock, 60 M, worth $15 per M; hickory, 40 M, worth $28 per M; ash and maple, 30 M, worth $25 per M; white-pine, 25 M, worth $30 per M. The use of wood for fuel is diminishing in *Hartford County*, coal taking its place on the farms as well as in the cities. The price per cord is $6 to $8, and the average yield of the forests 30 cords per acre. Chestnut, besides furnishing valuable lumber, is almost exclusively used for fences, railroad-ties, and telegraph-posts. In *Litchfield*, where very little of the first growth remains, and where the forests of second growth include all varieties growing in that latitude, chestnut is the most abundant. Iron-furnaces have been in operation in the county more than a century, and to supply them with charcoal the hills and mountains have been repeatedly stripped of their coverings. After the forests are cut, most kinds sprout vigorously from the stump, and others spring up from the seed; so that, if the cattle are excluded, the forest is soon renewed. Sprout-land, kept for the growth of wood, has proved remunerative, yielding every twenty-five years a crop of 25 cords per acre, worth $2 per cord standing. But the consumption of wood is diminishing, owing to the introduction of coal, and, as from other causes the amount of land under cultivation has decreased, the report affirms that there is more wood in the county and State now than twenty-five years ago:

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Fairfield	50,574	18.4	New London	86,584	25.9
Hartford	88,525	23.7	Tolland	57,471	26.9
Litchfield	101,656	22.4	Windham	74,094	26.9
Middlesex	53,454	32.8			
New Haven	64,975	23.0	Total	577,333	24.4

NEW YORK.—The forests in *Schuyler* are second growth. The average value of timber-lands is $50 per acre. The average yield, 50 cords, worth standing 50 cents per cord. The yield per acre in *Dutchess* is 30 cords, valued in the tree at $2 per cord. About one-third of the forests in *Greene* consists of second-growth timber. The mountains were originally covered with a heavy growth of hemlock, which was cut for the bark, the logs being left to decay. Spruce lumber is now worth $18 to $20 per M. The average yield of wood is 30 cords per acre. *Richmond* is being rapidly stripped of its best timber, but has yet many small lots of oak and hickory of the finest quality. From a tract of 25 acres, bought two years ago for $130 per acre, were cut 50 cords of wood per acre and enough lumber to justify the putting up of a steam saw-mill at a cost of $2,500. This is reported as a fair specimen of the best-timbered

lands. The average yield of the uncut forests in *Wayne* is 40 to 60 cords per acre. About 10 per cent. of what is reckoned as forest-area is in the condition of "slashings," and there is a prevailing disposition to devote such land to a new growth. The best forests within five miles of villages are worth $80 per acre; farther back, $60 to $40. Forests have receded in value fully 20 per cent. in five years. In *Columbia* the forests, all second growth, average 25 cords per acre, worth standing $2 per cord. Pine lumber is worth $20 to $30 per M; hickory, $40; other kinds, about $30. Though millions of oak and pine, rafted down the lakes and shipped via the Erie Canal to New York, have left the forests of *Seneca* badly scarred, yet much valuable timber remains. Where maple, bass, and elm prevail, 100 cords per acre have frequently been cut. In *Suffolk* the forests are mainly of pine and oak. The best yield 75 cords per acre. An instance is given of a tract on which the same man has cradled rye, and subsequently cut off three crops of wood. White oak and hickory, seasoned, are worth $50 to $80 per M; chestnut ties and posts, 50 cents each; rails, 12 cents. White cedar finds a market for boat-building. Standing wood is worth $1 to $2.80 per cord. In *Chautauqua* but little forest is left in its original state. Within twenty years thousands of acres have been cut for the railroads, and the remainder greatly injured by raging fires in dry seasons. The price of forests, for the timber alone, ranges from $25 to $100, according to location and kind. There are small lots of pine-forest in *Fulton*, valued at $300 per acre, and in the northern section some heavy mixed forests, ranging in value from $5 to $100 per acre, according to accessibility. More care is being taken of the forests remaining in *Genesee*, but the growth does not yet equal the consumption. The original growth of hemlock in *Delaware* has been nearly all cut off for the Philadelphia market. This is followed by a second growth of chestnut, oak, birch, beech, poplar, etc. From the sugar-maple in the county over 700,000 pounds of sugar are manufactured annually. Many chestnut-ties are grown, worth, at the railroad, 50 cents each. The best forests yield over 50 cords per acre. The railroads use chiefly coal, and its use for fuel is increasing. Much standing wood can be bought for 25 cents per cord, the value being less than ten years ago. The forests in *Onondaga* are chiefly in small lots on farms for home use. The largest timber-lot is a swamp of black ash. Coal is chiefly used for steam and house-warming, and pine-lumber is imported from Michigan and Canada. Complaint is made that many kinds of forest-trees are dying, and especially linden or bass. Of the forest-trees growing in *Yates*, 60 per cent. are oak and 25 per cent. elm, the remaining 15 per cent. being made up of all varieties. A few small plantations of yellow-locust have been set out, and have grown well, though the borer has injured them badly. One plantation of larches is on trial, and gives promise of success. At least 90 per cent. of the forests have been cut over, and the present growth is only fit for wood, yielding an average of 25 cords per acre, worth, standing, $1 per cord. In *Washington* nearly all the accessible original timber has been cut off; yet there are some groves of hemlock, valued at $500 per acre; of pine, at $1,000; and of oak and chestnut at fabulous prices. The average yield of wood is 60 cords per acre; 100 to 125 cords per acre are not unfrequent, and occasional lots yield 200. Except in localities difficult of access, hard wood sells on the stump at $2.50 to $3 per cord. The forests are mostly cleared out of *Livingston*. Fence-timber is becoming scarce, and many of the farmers are now burning coal. It is held that one-eighth of the land now under cultivation planted in forests for wind-breaks and fuel would largely increase the agricultural resources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44
43
42
41
ST. LAWRENCE 28.2
FRANKLIN 34.5
CLINTON 27.8
ESSEX 33.0
JEFFERSON 18.6
LEWIS 35.6
HERKIMER 21.1
HAMILTON 75.3
WARREN 39.3
WASHINGTON 22.2
OSWEGO 24.8
ONEIDA 19.3
NIAGARA 14.8
ORLEANS 14.0
MONROE 9.3
WAYNE 14.8
16.5
ONONDAGA 13.8
MADISON 18.2
FULTON
SARATOGA 21.3
ERIE 21.2
GENESEE 15.8
WYOMING 21.5
LIVINGSTON 18.8
ONTARIO 16.9
YATES 18.2
SENECA 12.6
CAYUGA
MONTGOMERY 12.2
SCHENECTADY
CORTLAND 24.4
CHENANGO 22.3
OTSEGO 23.7
SCHOHARIE 24.9
ALBANY 17.5
RENSSELAER 15.1
CHAUTAUQUA 28.5
CATTARAUGUS 42.6
ALLEGANY 36.2
STEUBEN 34.8
SCHUYLER 21.9
TOMPKINS 20.1
CHEMUNG 30.7
TIOGA 31.5
BROOME 31.7
DELAWARE 16.4
GREENE 26.6
COLUMBIA 13.5
ULSTER 38.1
SULLIVAN 36.4
DUTCHESS 38.9
ORANGE 22.0
PUTNAM 27.3
WESTCHESTER 20.9
ROCKLAND
NEW YORK
SUFFOLK 49.6
QUEENS 18.4
RICHMOND
KINGS

New York.

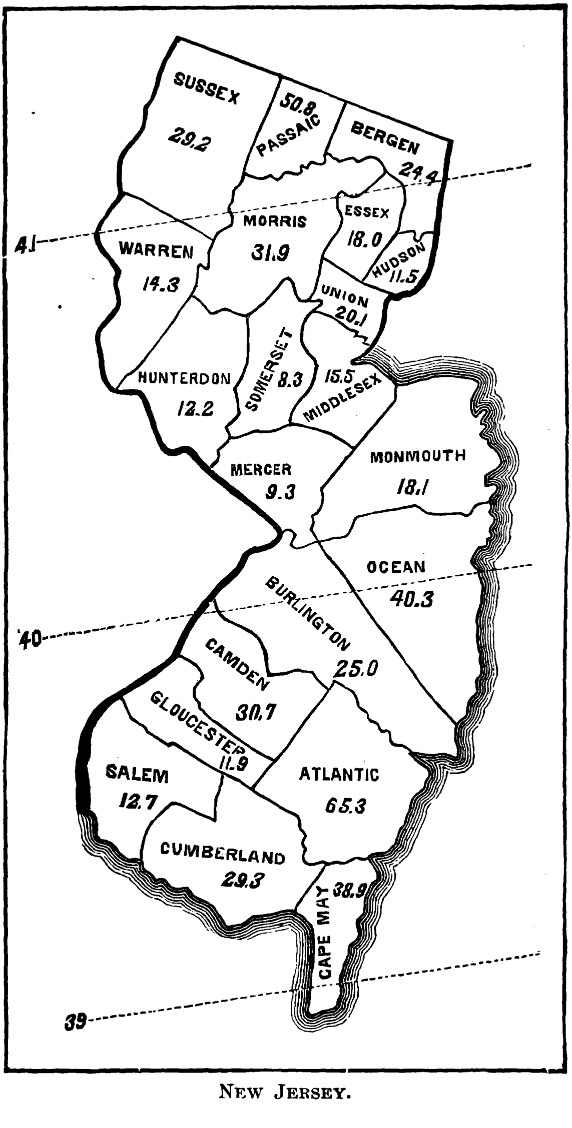
and value of the county. In *Wyoming*, timber-land is worth 25 per cent. more than improved, or $80 to $100 per acre. Maple and beech, in about parts, constitute 80 per cent. of the forests; hemlock, 8 per cent.; and bass, 7. Maple and beech also constitute the larger part in *Madison*, where standing wood is not worth over 30 cents per cord, and "body-maple" not over $2 in market. But hemlock-bark brings $6 to $8 per cord, and lumber $12 to $16 per M. Cleared-land is worth at least as much after the timber and wood are removed as before. *Schoharie* reports that the forests are being exhausted very fast. The best are of oak, and are worth $150 per acre. The average yield of wood is 30 to 50 cords per acre, worth $2 standing. Many of the forests remaining in *Allegany* are cleared of timber, the most valuable of which was white pine, varieties of oak, hickory, and hemlock. Pine-lumber is now worth about $20 per M; oak, $16; ash, much more, large quantities being shipped to Europe. Tanneries, working up 500 to 1,000 hides daily, make a market for large quantities of hemlock-bark. In *Monroe*, land is reported as too valuable for farming and horticulture to admit of profitable forest-growing. The original forests yield about 65 cords of wood per acre; worth, standing, about $3.25. *Montgomery* has now no timber for export. The best forests of beech, maple, &c., yield about 90 cords per acre; worth, on the stump, $2 per cord. There is but little valuable timber left in *Niagara;* all lumber for finishing, and much for fencing, is brought from Michigan and Canada. Much of the woodland is worth $100 per acre, and the farmers are using coal largely. The unculled forests would average 50 cords of wood per acre. In *Cattaraugus*, land principally covered with pine is worth $30 to $100 per acre; with hemlock, $20 to $50; with beech and maple, $16. Oak is manufactured into staves for barrels and firkins, and considerable is exported. The most valuable forests in *Chenango* were of pine, which has mostly disappeared. Chestnut and oak are the next in value. Recently a lot of chestnut-timber was sold for railroad-ties at $80 per acre. The average value of standing wood is $20 per acre. The forests in the northern part of *Ontario* are principally of oak, hickory, bass, elm, ash, and beech, and worth $50 to $100 per acre; in the southern part, of pine, hemlock, and chestnut, and average in value $50 to $75. Many young trees on the hills are cut for hoop-poles. The report states that young timber, which would add annually 10 per cent. to its value by growth, is being wantonly destroyed, leaving the hills bleak, sun-burnt, and impoverished. *Erie*, which formerly produced large quantities of white oak, now imports much from the West and Canada. Its primeval forests also abounded in black walnut, which had no extra value until the Erie Canal was finished, in 1825; but since then it has steadily risen, until it is now worth $40 per M, and is almost gone. Elm, for barrels and cheese-boxes, is worth, standing, $3.50, and bass, for tops and bottoms, $7 per M. White ash, in logs at the mill, brings $12 to $14 per M. Timber is becoming scarce, and many are setting out forest-trees. The chestnut is being grown in nurseries for timber as well as fruit. The native elm will grow in most kinds of soil, and outgrows almost all other trees. From about 1825, the price of wood gradually increased until within ten or twelve years, when it was worth at Buffalo $6 to $10 per cord. Since then, owing to the increasing use of coal, it has receded, until the range is now $4 to $8. Many tracts in *Otsego*, after the timber is cut off, are kept for successive crops of hop-poles; a crop attains the proper growth in about ten years, and an acre will often yield 2,000, worth, standing, $20 to $30 per thousand. Good timber-land is worth $50 per acre, and at that rate the wood-product will pay for it, leaving

the cleared land for net profit. According to the State census of 1875, there were in *Broome* 124,549 acres in forest, embracing all northern varieties of timber and wood. Pine and white-wood lumber sell for $25 per M; oak, ash, and cherry, $30; hemlock-bark, $6 per cord.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Albany	54, 892	17. 5	Onondaga	60, 478	13. 8
Allegany	214, 278	36. 2	Ontario	67, 958	16. 9
Broome	118, 103	31. 7	Orange	92, 300	22. 0
Cattaraugus	274, 373	42. 6	Orleans	31, 364	14. 0
Cayuga	68, 492	16. 5	Oswego	118, 424	24. 8
Chautauqua	177, 840	28. 5	Otsego	143, 817	23. 7
Chemung	08, 071	30. 7	Putnam	34, 766	27. 3
Chenango	119, 410	22. 3	Queens	28, 466	18. 4
Clinton	99, 037	27. 8	Rensselaer	54, 493	15. 1
Columbia	50, 660	13. 5	Richmond	3, 379	19. 3
Cortland	75, 044	24. 4	Rockland	18, 523	32. 9
Delaware	75, 732	16. 4	Saratoga	87, 575	21. 3
Dutchess	295, 957	38. 9	Schenectady	18, 237	14. 7
Erie	117, 983	21. 2	Schoharie	93, 200	24. 9
Essex	150, 847	33. 0	Schuyler	41, 259	21. 9
Franklin	114, 362	34. 5	Seneca	24, 531	12. 6
Fulton	107, 869	40. 9	Steuben	264, 729	34. 8
Genesee	44, 284	15. 8	Saint Lawrence	278, 507	28. 2
Greene	90, 404	26. 6	Suffolk	158, 768	49. 6
Hamilton	73, 947	75. 3	Sullivan	143, 902	36. 4
Herkimer	80, 644	21. 1	Tioga	88, 582	31. 5
Jefferson	129, 862	18. 6	Tompkins	57, 039	20. 1
Kings	459	3. 8	Ulster	175, 556	38. 1
Lewis	154, 679	35. 6	Warren	136, 545	39. 3
Livingston	69, 880	18. 8	Washington	103, 783	22. 2
Madison	71, 042	18. 2	Wayne	52, 410	14. 8
Monroe	36, 936	9. 3	Westchester	50, 758	20. 9
Montgomery	29, 765	12. 2	Wyoming	78, 007	21. 5
New York	69	5. 5	Yates	36, 362	18. 2
Niagara	44, 937	14. 8			
Oneida	126, 234	19. 3	Total	5, 679, 870	25. 5

NEW JERSEY.—The forests in *Salem* are principally second growth, of oak and chestnut; the latter used chiefly for fences, and the former for lumber and fuel. The several railroads through *Hudson*, and the two more now in process of construction, have used up nearly all the white oak and chestnut, and left less than 500 acres in forests of any kind, except the evergreens planted by a few parties, chiefly for beautifying their grounds. Wood for fuel sells for $6 to $8 per cord, and hickory, for spokes, for $12 to $15. The forests in *Camden* are nearly all of second growth. The few acres of white and black oak and chestnut of first growth are valued at about $300 per acre; second growth, about $30; first-growth cedar, $600 to $800; second growth, $25 to $75, and there is a large area; also of second-growth pines, which are used for box-boards and other rough work. In *Warren*, three lots were recently sold from which the wood had all been cut off seventy years previous. One, the size not reported, one-third rock-oak, and the remainder black oak and chestnut, sold for $190 per acre; a second, of 50 acres, principally chestnut, for $180; and a third, of 12 acres, for $170. The first and second was for the timber alone; the third included the land. The bark of black oak is worth $10 per cord. As evidence that the oftener chestnut is cut the more the growth is multiplied, it is stated that the sprouts from one stump produced 60 railroad ties, worth 50 cents each. The few forests in *Mercer* are rapidly decreasing. The farmers consider land from which timber is cut off too valuable for cultivation to let another crop grow up again; though chestnut is excepted, owing to its rapid growth. Oak and hickory predominate in the northern part, where two steam saw-mills manufacture large quantities into felloes, which are shipped to California. Standing white-oak timber is worth

PLATE XXXII.



NEW JERSEY.

$15 to 20 per M; chestnut rails, $15 per hundred; hickory spokes, $25 to $30 per M.

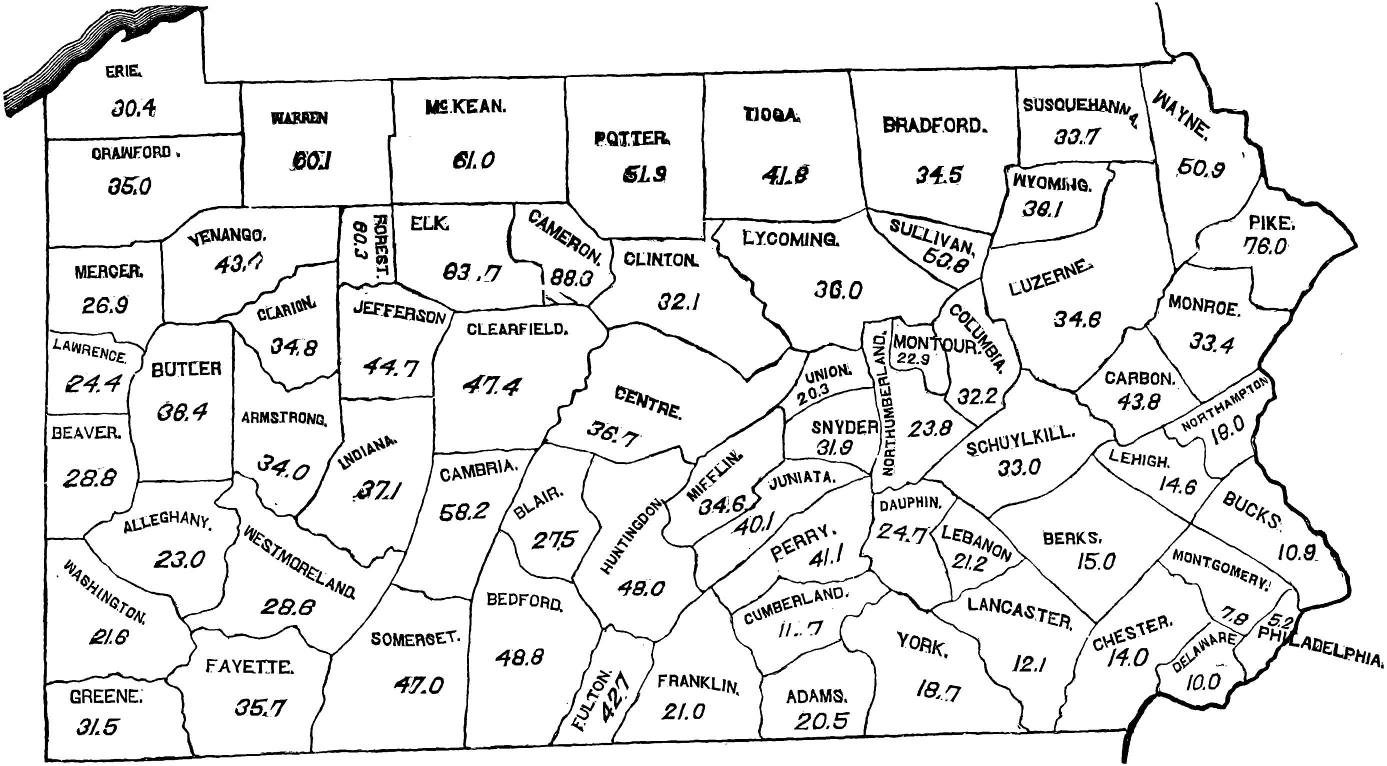
Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Atlantic	92, 506	65. 3	Monmouth	36, 882	18. 1
Bergen	25, 719	24. 4	Morris	73, 009	31. 9
Burlington	67, 022	25. 0	Ocean	52, 245	40. 3
Camden	34, 805	30. 7	Passaic	48, 636	50. 8
Cape May	16, 169	38. 9	Salem	22, 696	12. 7
Cumberland	41, 269	29. 3	Somerset	14, 507	8. 3
Essex	6, 221	18. 0	Sussex	67, 673	29. 2
Gloucester	14, 830	11. 9	Union	7, 485	20. 1
Hudson	316	11. 5	Warren	27, 758	14. 3
Hunterdon	32, 105	12. 2			
Mercer	12, 032	9. 3	Total	718, 335	24. 0
Middlesex	24, 450	15. 5			

PENNSYLVANIA.—The forests in *Bradford* are a mixture of hemlock, oak, chestnut, maple, beech, etc. Hemlock-lumber is worth about $8 per M. The central and southeastern portions of *Sullivan* are covered with dense primeval forests. Immense tracts are reported as covered with hemlock as fine as the world produces. These are intersected by ridge of hard wood, from which the timber has been largely cut off for the market, though the stock left will last for many years. For the last ten or fifteen years hemlock has been extensively destroyed for the bark. In many sections, the hemlock will yield 50 M to 75 M of manufactured lumber per acre. In *Fulton*, twenty-five years ago, the best of mountain-forest could be bought at 50 cents to $1 per acre; now it will bring $15 to $25 per acre. The most valuable timber on the mountains is chestnut, chestnut-oak, and yellow pine. Four very large steam-tanneries are very destructive on the chestnut-oak for the immense quantities of bark they consume. Mountain-land from which the pine and chestnut oak are cut off, in twenty to twenty-five years, will have a fine growth of chestnut fit for rails. A forest of large yellow pine, with a mixture of oak, chestnut, hickory, etc., was cut off from a lot twenty-five years ago. On it yellow pines grew up very thickly. Recently, after leaving some of the best standing, 50 cords of lime-kiln wood per acre have been cut from it. Nine-tenths of the land in *McKean* is in forests, though the valuable timber in them, such as pine, cherry, ash, and poplar, is nearly gone. Half the remaining timber is hemlock. About one-half the surface of *Mifflin* is occupied with broken land and mountains, on which are growing large quantities of chestnut, valuable for fencing, &c. *Bedford* contains about 12 acres of forest to one of cultivation. The mountains and high ridges are abundantly covered with white and yellow pine, rock oak, and chestnut. Tracts of chestnut readily yield 3,000 to 4,000 rails, for fencing, per acre, worth $5 per hundred. The lowlands abound with mammoth white oak, 8 to 12 feet in circumference, and knotless for 40 to 60 feet from the base; not of much value for the want of a market. From one locust-tree, recently cut, were made 183 No. 1 fencing-posts, worth 40 cents each. Chestnut grows so rapidly that in about sixteen years after the first cutting the land will reproduce an equal yield. About one-half the area of *Fayette* is mountainous, and fully one-half in forests or wild land. After making allowance for rocky and sterile parts, there remain about 190,000 acres of valuable timber-land. Of this, 20,000 acres will average 30 M of lumber per acre, worth on the stump $4 per M, and 40 cords of wood, worth $12\frac{1}{2}$ cents per cord. *Columbia* reports 139,449 acres of "unseated or forest lands."* Parts are

* Lands not included in farms.

well timbered, but other parts are mountains barren of timber. The average value is placed at $12 per acre. Hemlock, sawed, is worth $10 to $16 per M; hemlock shingles, $5 per M. White oak, sawed into scantlings for cars, brings $20 to $30 per M. Chestnut brings $15 to $25 per M. Half the area of *Somerset* is in forests, but perhaps more than half the original timber in them has been used or sold off. Locust is found in considerable quantities. While at least two-thirds the area of *Clinton* is reckoned as forest-land, a large percentage consists of mountains burned over, with little or no timber left. Most of the other, which was well timbered, has been denuded by the ax of the lumberman, but some valuable tracts of white pine have been reserved. It is believed that if some way could be devised to protect the timber growing in the mountains from fire, it would, in a few years, yield an inexhaustible supply at much less expense than forest-culture. In *Lawrence* one-half the growing timber is oak. Table-lands will cut 20 to 25 M, worth at the mills $15 to $20 per M. Cordwood will about pay for cutting and hauling on the line of the railroad, but not elsewhere. Sycamore is plenty along the rivers and creeks, and is coming into market for staves and headings for nail-kegs. It is worth, standing, $1.50 to $2 per cord. The timber in *Butler* is chiefly white oak, reserved for home use on the small farms, into which the county is cut up. Near the railroad, from land being cleared for farming, a few thousand dollars' worth of ties are sold, but the amount realized is but a small fraction of what is paid out for lumber imported for buildings and fences. In *Montour*, coal is chiefly used for fuel, and there is very little demand for cordwood. Most of the forests have had the valuable timber culled out. The forests in *Cumberland* average in value of products about $50 per acre. But choice timber, such as white oak, walnut, and poplar, average much higher. Some tracts would bring $100 per acre for the lumber and the cooper-stuff. A quantity of white oak is exported for ship-building. From the forests in *Westmoreland* the timber has been pretty freely culled. Oak, hickory, and chestnut are the leading kinds. Timber-lands are rapidly appreciating in value, and much less subjected to waste than formerly. The planting of locust, maple, horse-chestnut, and other trees, on farms and by the wayside is now quite common. One-seventh of *Erie* is still in primitive forest, and some good timber remains. White ash, being rapidly worked up, sells in the log at $10 per M. Wood is worth $1 per cord in the tree. On a four-hundred-acre lot of beech and maple forest, an average acre was worked up for a test, and the yield measured 53½ cords. The value of timber-land equals that of the best improved land. In *Wayne*, one-sixth of the land remains in forest of beech, maple, and birch, worth $5 to $15 per acre; but little pine left, and hard wood is being much used for timber. Hemlock is valuable for the bark, used in this county, as well as lumber. The principal forest-timber in *Pike* is of white and pitch pine, chestnut, hemlock, and oak of all varieties. The average yield is 50 M per acre, valued at $10 per M. The yield of cord-wood per acre is heavy, valued at 50 cents per cord. In the southern part of *Northampton*, the forests are principally of oak and hickory, and the value of the best, for the timber alone, is $100 per acre, and, in some cases, even $200 per acre is refused; but the average value is $75 to $100. Wood, in the cord, is worth about $5; hickory, $6.50 to $7. Timber is becoming scarcer every year. Paying debts and legacies by selling the timber on farms has been going on so long that farms of 100 acres average not more than 4 to 10 acres, and three out of five have none. Chestnut-rails are worth, on the ground, $12 per hundred. Walnut and pine are becoming scarce in *Perry*, but there are large

PLATE XXXIII.



FOREST AREA OF PENNSYLVANIA.

quantities of chestnut and chestnut-oak. Tracts of chestnut-forest will make 3,000 rails per acre, worth, in the tree, $30 per M. The forests on the mountains, in which chestnut-oak prevails, are worth, in the tree, for bark, wood, and timber, about $12.50 per acre. The forests on low-lands, having white oak and other tough timbers, are very valuable. According to the latest statistics, *Lycoming* contains 110,689 acres in forests. It is estimated that they include white pine equivalent to 100,000 M, worth, in the tree, $5 per M; hemlock, 500,000 M, worth $2 per M; hard-wood timber of different kinds, 200,000 M, worth $2 per M. After removing the timber, there would be left 25 cords per acre of wood, worth, in the tree, 60 cents per cord—making the growth average $32. One-sixth the area of *Susquehanna* is in forests. Rock-maple is the leading kind. The maximum yield per acre is estimated at 400 cords; the minimum, 25; average, 100; worth, standing, 25 cents per cord. In the tree, hemlock is worth, for the lumber, $1 per M, and for the bark, $2 per cord; linden, ash, oak, pine, chestnut, walnut, and butternut, $10 per M. The timber has been already cut out from 40,000 of the 80,000 acres* of forest in *Union*. The fires, every year or two, injure the growth on about 20,000 acres growing up to chestnut. About 20,000 acres will average 12 M of lumber per acre; 30,000 will average 20 cords of wood per acre. *Forest* County is well timbered, 50 per cent. of the area being covered with hemlock, 20 per cent. with hard wood, and 10 per cent. with pine, leaving 20 per cent. under cultivation. The yield of lumber in the hemlock forests is placed at 40 M per acre. About 27 parts out of 28 in the area of *Elk* is covered with forest; mostly a dense growth of white pine, hemlock, and the various kinds of deciduous wood. There are at least 200,000 acres of hemlock, yielding per acre an average of 10 cords of bark and about 18 M of lumber. The value of lumber in the tree is at present nominal; of bark for tanning, 25 cents per cord. Of the 250,000 acres in *Cameron*, only about 6,600 are improved. The amount and value of forest-products is estimated as follows: Pine (white and yellow) and oak timber, 600,000 M of lumber, worth, in the tree, $3 per M; hemlock, 800,000 M, worth $1.50 per M; 2,000,000 cords of wood, 50 cents per cord; 20,000 M of chestnut and hickory, $4 per M. Forest fires have been very destructive. From *Tioga*, 90 per cent. of the pine and oak and 50 per cent. of the hemlock have been cut off. There are reported yet remaining at least 200,000 acres in forest, much of which is thickly covered with a young growth of oak and hickory. The average value of the timber and wood is placed at $8 per acre. The forests of *Cambria* average in value $12 to $15 per acre. A large amount of small timber is used in the mines for props, ties, &c., and young growth yields for this purpose $20 to $25 per acre. In *Lancaster*, good timber-forests sell as high as $300 per acre, the land not included. Locust is planted to some extent along the fences on farms, and is considered very valuable. The best forests in *Chester* sell for $125 to $200 per acre, exclusive of the land. Hickory wood in the tree is worth $3.50 per cord; other hard wood, $3; oak timber, $10 per M; chestnut rails, 11 feet long, 3 to 5 cents per rail. The forests are mainly made up of oak, hickory, and chestnut. The timber lands in *Dauphin* are generally mountainous. On the ridges, chestnut, valuable for rails, abounds; such forests sell at $10 to $50 per acre, and, in addition to the chestnut, average 25 cords of oak, hickory, and other wood per acre. The wood is worth, in the tree, 50 cents per cord. But one-tenth the area of *Washington* is forest-land. Three-fourths of this is covered with white, black, and red oak, and one-fifth with maple and

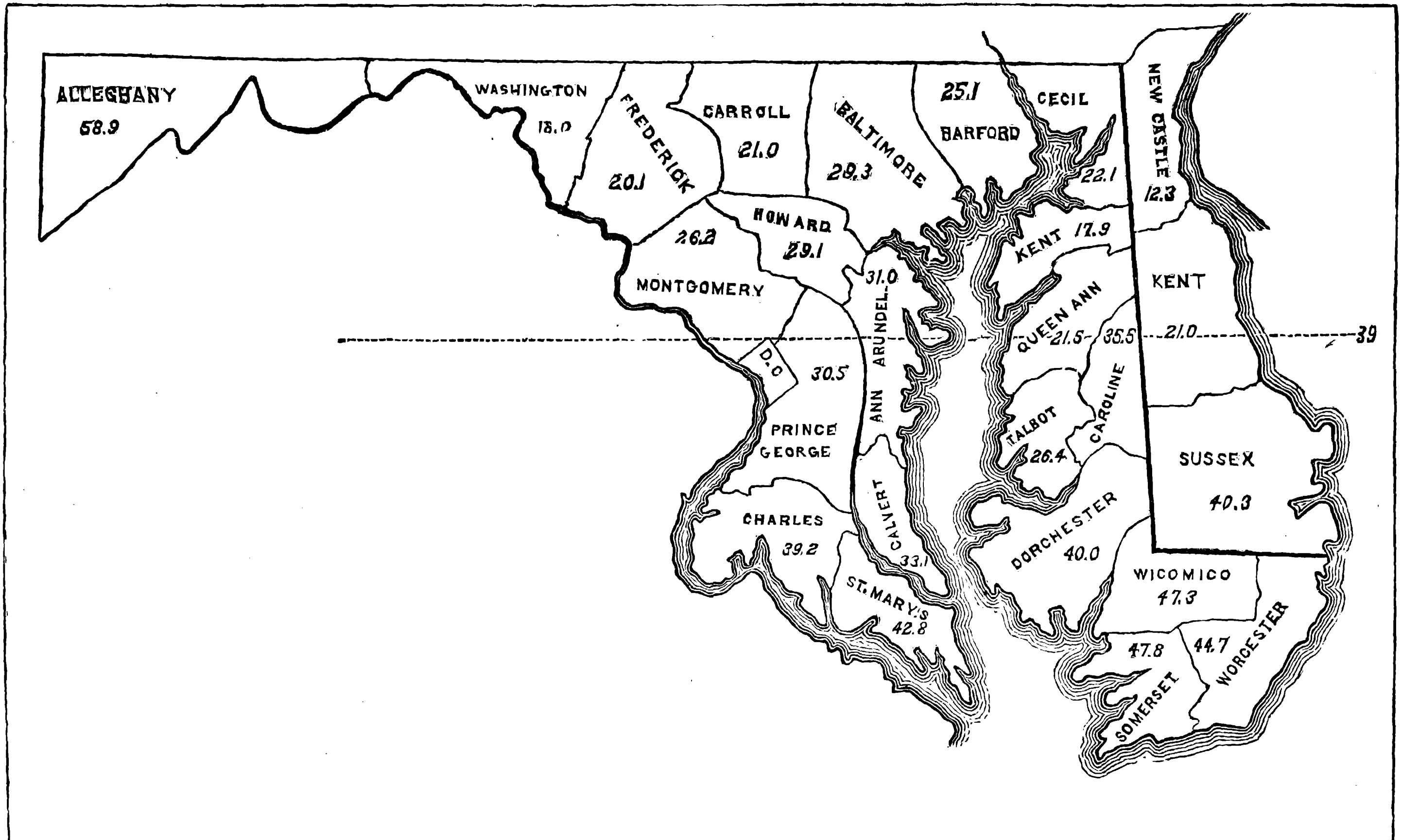
* Including "unseated" forests.

locust, in equal quantities. The average value of standing timber is $60 per acre, or at the mill, sawed, $250 per acre. There is a home-market for all the lumber. Very little wood is used for fuel. In the southwest part of *Indiana* County the timber is pretty much used up; the other parts are well timbered with pine, spruce, hemlock, chestnut, chestnut-oak, &c. Pine land is worth $50 to $150 per acre; other timber-land averages $30 per acre. Not much wood used for fuel. Millions of staves and railroad-ties are manufactured. The consumption of timber for the next fifteen years, at the rate for the last fifteen, would use up all the surplus in the county. The forests in *York* are chiefly of white and rock oak, hickory, and chestnut; average 35 cords per acre, and net $50 per acre. The forest-land in *Clearfield* is estimated at 614,000 acres, averaging 75 cords per acre, worth, on the stump, 50 cents per cord. These forests include all the leading varieties of timber.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adams	56,133	20.5	Lancaster	65,413	12.1
Allegheny	89,050	23.0	Lawrence	49,500	24.4
Armstrong	121,756	34.0	Lebanon	38,981	21.2
Beaver	71,849	28.8	Lehigh	32,367	14.6
Bedford	199,569	48.8	Luzerne	127,610	34.6
Berks	70,932	15.0	Lycoming	110,689	36.0
Blair	41,607	27.5	McKean	48,177	61.0
Bradford	204,992	34.5	Mercer	105,289	26.9
Bucks	39,814	10.9	Mifflin	54,959	34.6
Butler	157,247	36.4	Monroe	65,470	33.4
Cambria	133,979	58.2	Montgomery	22,310	7.8
Cameron	61,216	88.3	Montour	16,019	22.9
Carbon	26,499	43.8	Northampton	14,955	8.0
Centre	89,129	36.7	Northumberland	46,069	23.8
Chester	62,161	14.0	Perry	108,240	41.1
Clarion	95,394	34.8	Philadelphia	2,117	5.2
Clearfield	129,536	47.4	Pike	88,065	76.0
Clinton	40,994	32.1	Potter	87,329	51.9
Columbia	66,245	32.2	Schuylkill	60,876	33.0
Crawford	184,436	35.0	Snyder	44,070	31.9
Cumberland	33,909	11.7	Somerset	237,229	47.0
Dauphin	57,788	24.7	Sullivan	57,059	53.8
Delaware	10,105	10.0	Susquehanna	148,789	33.7
Elk	28,606	63.7	Tioga	148,153	41.8
Erie	126,427	30.4	Union	18,324	20.3
Fayette	136,027	35.7	Venango	96,167	43.4
Forest	29,039	60.3	Warren	131,214	60.1
Franklin	75,448	21.0	Washington	113,404	21.6
Fulton	87,564	42.7	Wayne	158,892	50.9
Greene	106,720	31.5	Westmoreland	139,316	28.6
Huntingdon	179,107	48.0	Wyoming	57,840	36.1
Indiana	159,181	37.1	York	100,139	18.7
Jefferson	107,425	44.7			
Juniata	65,929	40.1	Total	5,740,864	31.9

DELAWARE.—The best timber has long since disappeared from *New Castle*. "Well-set" woodland is worth $75 to $125 per acre for the wood-product alone. About 10 per cent of the area is in forest, principally oak, poplar, and maple, mainly reserved for fence-timber, which is very difficult to obtain. About one-third the area of *Kent* is in forest, mainly confined to the lowlands not suitable for cultivation. The white oak, unsurpassed in value for ship-building, is becoming scarce. The smaller oaks are cut for railroad-ties and piles. Well-set second-growth woodland yields 30 to 40 cords per acre, worth, standing, $1 per acre.

Counties.	Acres.	Per cent.
Kent	65,138	21.0
New Castle	30,609	12.3
Sussex	199,415	40.3
Total	295,162	28.0



DELAWARE AND MARYLAND.

PLATE XXXIV

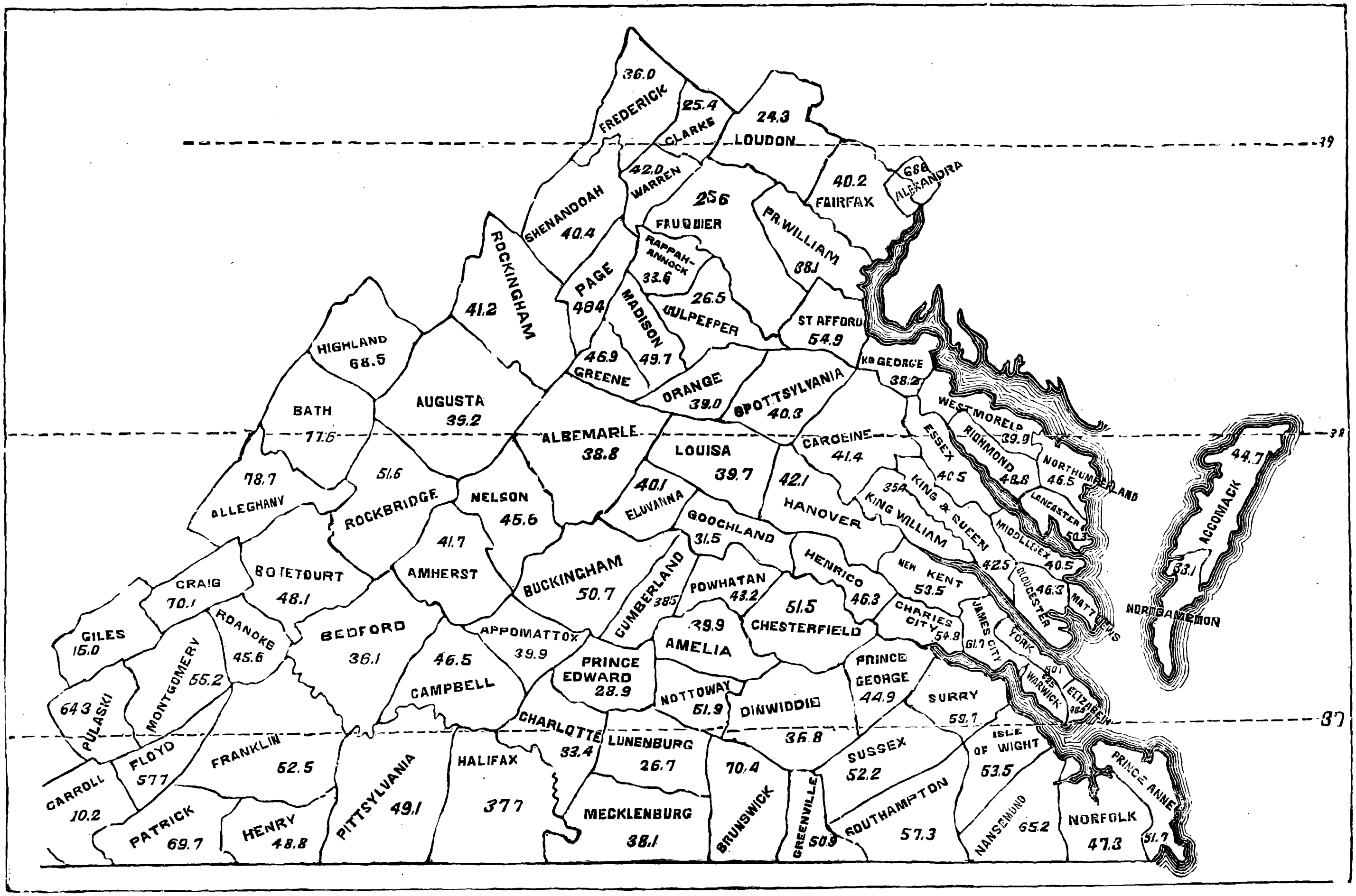
MARYLAND.—Within a few years a large number of saw-mills have used up the best part of the forests in *Charles;* but there is a large quantity of pine suitable for scantlings and fuel, averaging about 35 cords per acre. The upland oak and poplar are reported as very superior in quality, of slow growth, hard and tough. *Baltimore* county reports 96,000 acres in forest, but most of it stripped of its valuable timber. It is estimated that it would require 800,000 trees to line the highways of the county with trees two rods apart. This does not include the many thousands that might be set with advantage along the railroads, and as shade-trees in other places. *Dorchester* is well timbered. Pine-land yields 30 to 40 cords per acre, wood of the first quality, worth in the tree $1 to $1.50 per cord, or $2.25 to $2.50 at the numerous landings on the navigable waters. Very valuable white-oak ship-timber abounds; also, the black-gum tree, suitable for hubs, of which large quantities are shipped; and the sweet-gum tree, from which peach-baskets are largely manufactured in the county. *Harford* is well wooded, and the forests are much better cared for than formerly. Coal is used for fuel on most of the farms. Good forests cut 40 to 60 cords of wood per acre, worth $2.50 in the woods. Chestnut-rails, used almost exclusively for fences, are worth $60 to $75 per thousand; posts, $120 to $140 per thousand. The stumps are generally protected from cattle, and the sprouts attain a size suitable for cutting in about twenty years. Chestnut and white-oak ties are worth, delivered, 55 cents each. A carriage-factory in the county, and demands for shipping, have thinned the hickory until it is worth about $50 per M. Poplar, ash, oak, walnut, etc., are worth $30 per M at the mill. It is estimated that about five-twelfths of the area in *Montgomery* is covered with forest, 67 per cent. of which is original growth, and 33 per cent. second growth, mostly pine. The area of old forests is slowly decreasing, but it is thought that the consumption of the growing pines does not equal the growth. The primitive forests are principally of oak, hickory, poplar, chestnut, and black gum. Land in forest is not generally valued as high as that under cultivation. Not more than 10 per cent. of the area of *Cecil* is in forest, and that mostly in the northern part. A large tract, from which the first growth was cut to supply the furnaces, has now a second growth of thrifty young timber. Good timber-land is worth $40 per acre. In *Wicomico,* the most plentiful and remunerative forest-trees are the several varieties of pine. They spring up on worn-out land and grow quickly, yielding a large crop of wood and timber in sixteen to twenty years. It is estimated that the annual growth of pines on such land nets 10 per cent. on the investment; in one instance, the actual result of eighteen years' growth was 17 per cent. profit per annum. Forests of primeval growth sell at $30 to $60 per acre, according to location. Half the forest in *Caroline* is pine. The average yield of wood is 30 cords per acre, worth, in the tree, $1.50. In good timber-forest, the standing timber is worth $100 per acre. White-oak lumber sells for $20 per M. About one-third the area of *Prince George's* is in forest, principally on farms, and is well cared for. These forests are chiefly made up of oak, chestnut, and poplar. Not more than one-twentieth of *Frederick* is now covered with forest-growth. Some black-walnut timber goes to the cities, large quantities of white oak, hickory, ash, and poplar are worked up in home manufactories. Large quantities of wood are turned into charcoal for the furnaces in the county. Forest-area decreases at the rate of 1,000 acres annually. Some tracts sell for $80 per acre, but mountainous tracts, difficult of access, for $1 per acre. One-half the area of *Worcester* is yet in forest, mostly pine; average net value of the product, $12 per

acre; yield of wood, 30 cords per acre. Immense quantities of pine in boards and wood, marketed in the large cities, and large amounts of white oak sold for ship-building. In *Calvert* large areas are covered with chestnut, and for each tree cut several sprouts start from the stump, which often in twenty years make good timber. There are also large tracts of oak, and others of pine.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Alleghany	179, 146	58. 9	Kent	31, 464	17. 9
Anne Arundel	67, 423	31. 0	Montgomery	66, 666	26. 2
Baltimore	96, 326	29. 3	Prince George's	61, 887	30. 5
Calvert	38, 168	33. 1	Queen Anne	42, 245	21. 5
Caroline	60, 758	35. 5	Saint Mary's	83, 436	42. 8
Carroll	54, 310	21. 0	Somerset	59, 399	47. 8
Cecil	42, 868	22. 1	Talbot	40, 108	26. 4
Charles	66, 158	39. 2	Washington	40, 761	18. 0
Dorchester	56, 819	40. 0	Wicomico	88, 119	47. 3
Frederick	73, 228	20. 1	Worcester	95, 615	44. 7
Harford	33, 945	25. 1			
Howard	60, 139	29. 1	Total	1, 435, 988	31. 8

THE SOUTHERN BELT.—It has been seen that in the Eastern and Middle States mechanical and manufacturing industries are so multiform and so diffused that forest-products of all kinds and qualities find a local market at remunerative prices. In the cotton and tobacco States, owing to a general absence of such industries, there are vast quantities of timber of almost all useful varieties, and of the highest excellence, which are of little or no present value to the owners, because the manufacturing establishments which consume forest-products are so distant that the cost of transportation equals or exceeds the price in market. Beyond a quite limited use for building, and the demand for fences and railroad-ties, there is scarcely any home-market. A peculiarity of the forest-lands in these States is a vast extent of second-growth, mostly pine, covering soil worn out by exhaustive cultivation, and abandoned. Included in the primeval forests yet remaining are extended tracts of yellow and pitch pine, and immense swamps of cypress and cedar, varieties of oak, including live oak in the Gulf States; hickory, walnut, cherry, poplar, gum, and chestnut are among the valuable kinds generally diffused. In several localities chestnut, for some undiscovered reason, appears to be dying out.

VIRGINIA.—A large area of *Northumberland* is in pine-forests. Annually 25,000 cords of wood are stripped, but the pines grow rapidly and the area is increasing. Land cut over in 1842–'43 now yields 70 cords per acre. Within five years, over 250,000 railroad-ties have been shipped from the county, averaging, on the shore, 57 cents per tie. At least one-half of *Chesterfield* is yet heavily wooded with a growth of young oak and pine, which, at a distance of three to five miles from the railroad, can be bought at $5 to $10 per acre. Settlers from the North and West are fast taking advantage of these low prices. In *Highland*, white and yellow pine and white oak are abundant. Lumber of the former, at the mills, is worth $12.50 per M; of the latter, $20; pitch pine, $10. In the highlands, chestnut-oak (the bark is worth $5 per cord) and chestnut abound. The latter brings $30 per M. Not less than 1,000 bushels of chestnuts per annum are exported, averaging $2 per bushel. The best forests in *Grayson* yield 100 to 200 cords per acre. Oak is the most abundant timber. There are in *Campbell* about 150,000 acres in forest. Much of it excellent pine-timber, yielding 10 M feet of lumber per acre, worth, in market, $12 to $18 per M. There are also large quantities of



VIRGINIA.

PLATE XXXV.

oak, chestnut, and maple, and very extensive tracts of old fields on which pines are growing rapidly. But the timber is rapidly disappearing before steam saw-mills. In *Warwick*, there are about 10,000 acres in pine, 6,000 being second growth, and 10,000 more in mixed forests of oak, gum, beech, maple, etc. Since the war, most of the timber has been cut out from the forests in *Princess Anne*, reducing their average value to $10 per acre. The average yield of wood is 40 cords per acre, mostly pine, and worth 25 cents per cord. About half the area in *Lunenburgh* is covered with a second growth of pine of all sizes. This kind of forest-area is extending, owing to the prevalent style of cultivation. For the same reason, the area of about one-eighth of original oak forest is decreasing. These original forests yield 100 or more cords of oak wood and 5 to 10 M of pine-lumber per acre. The original forests in *Prince Edward*, exclusive of the pine, poplar, and hickory timber, yield 25 to 50 cords of wood per acre, worth, standing, 30 to 50 cents per cord; "old-field" pine-forest, 20 to 50 cords, worth, delivered, $1.50 to $2.25 per cord. Pine-lumber, standing, $5 per M; white oak, $6; walnut, poplar, sycamore, and birch, for cabinet-work, sawed, $20 to $40. *Page* has abundant forests, principally of white and chestnut oak, chestnut, hickory, pine, and poplar. The county is likely to abound in good timber until there is a railroad through it. In *Pittsylvania* timber-land has decreased 30 to 40 per cent. since 1870. The wood cut from it is disposed of at a nominal price, the main purpose being to get new land for tobacco and other crops. Yellow-pine lumber is worth $10 to $16. In *Elizabeth City* standing hard wood is valued at $125 per acre, and the average product is 75 cords; the average product of lumber per acre is 10 M. The principal kinds are yellow pine, red and white oak, and cypress. There are about 20,000 acres in forest, 10,000 of which is in primitive condition or irreclaimable swamps. *Dinwiddie* has 14,750 acres of original oak and pine forest, the timber of which, standing, is worth about $10 per acre. There are about 186,864 acres of second-growth pine. Forests in *Pulaski* yield from 50 to 200 cords of wood per acre, worth, standing, 50 cents per cord. The prevailing kinds are oak and pine, worth, at the mill, $15 per M. Walnut lumber is scarce, and brings $40 per M. An agent has recently been paying a very high price for it in the log to ship to Liverpool. The larger part of the timber in *Smyth* is oak and poplar, with considerable black walnut. A large portion of the area is still covered by the virgin forest, well timbered on the low lands; not as well in the mountain slopes. A good business has been done in working the best white oak into pipestaves for shipment to Norfolk. In many instances the chestnut-oak is cut for the bark, and the timber left to decay. Timber-lands vary in value from $3 to $25 per acre. In *Roanoke* the best timber is so remote from rail that to haul it does not pay. Since the war the indiscriminate destruction of forest for miles back from the railroad, for wood, has been highly disadvantageous. About 20 per cent. of the land in *Frederick* is timbered, mostly with oak, valued at $25 per acre. In *Caroline*, 25 per cent. of the area is in forest, of which not over 5 per cent. is fit for timber. The average yield is 20 cords per acre, and the value per acre $3 to $6. About 67 per cent. of the land in *Powhatan* is covered with forests of oak and pine, including much excellent pine timber and a large extent of old-field pine. The yield is 20 cords per acre, and the value of standing pine wood 35 cents per cord. From 17 to 20 per cent. of the area in *Clarke* is in forest, only a small portion of which is heavily timbered. The average of wood per acre is 40 to 50 cords. The timber includes some black walnut and white oak,

which is of the toughest and best quality. From 33 to 50 per cent. of the lands in *Rappahannock* are in forests, largely on the mountains. The mountain land, with the timber on it, sells at $3 to $6 per acre. Large quantities of chestnut-oak bark are used in the county for tanning, one company using annually 2,500 cords, at $6 per cord. The forests in *Scott* include white and yellow poplar and all kinds of oak. White oak predominates. Chestnut is abundant in the mountains, and among other kinds black walnut is found. The yield of wood per acre is estimated at near 100 cords. *Halifax* reports about 110,000 acres in original forest, 40,000 partly cut, and 70,000 in old-field pines of all stages of growth. Many parts are heavily timbered with pine, oak, hickory, poplar, and other kinds. Along the railroad, oak is being extensively manufactured into staves. The average value of standing timber is $2.50 per M. Old-field pines of forty years' growth in some instances yield more cords per acre than the adjacent original forest. In *Prince William*, 50 per cent. of the surface is timber and bush land. Below the Occoquan, 70 per cent. is pitch-pine, yielding 30 cords per acre. The other varieties are black walnut, oaks, chestnut, etc. In *Gloucester*, the forests are partly of pine, mixed with oak and chestnut, but the best are of pine alone, yielding 25 to 35 cords per acre, worth, in the tree, 75 cents to $1 per cord. The county has eight steam saw-mills, varying in capacity from 3,000 to 6,000 feet per day. The average value of lumber at the mills is $12 per M; oak ties, standing, 50 cents each; wood, on the shores, $3 per cord. Exclusive of those employed in cutting and hauling logs to the mills, there are at least 1,200 persons occupied in cutting ties, ship-timber, and wood, and therefore the forests are rapidly decreasing. In *Fluvanna*, much yellow pine of superior quality still remains, but it is too far from market to be profitably cut at present prices. In *Sussex*, there are three grades of forest, original, second-growth, and old-field pines. The first covers 10 per cent. of the area, including swamps, in which much of the most valuable timber is found. The best pine-forests will cut per acre 20 M of heart-plank, worth $12 to $15 per M. As evidence of the abundance of pine it is stated that all the dwellings in the county, except three, are built of it. The abounding old-field pines yield an average of 20 cords per acre. These lands can be bought for less than $5 per acre, and the wood cut and hauled will net 50 cents per cord. Large quantities of lumber are shipped via Norfolk to northern cities. A considerable number of northern capitalists have located in the county and are doing a lucrative lumber-business; thus giving an impetus to the real-estate market. The forests in *Madison* are original, principally of oak, hickory, chestnut, walnut, and pine, and old-field pine. The oak growth averages 50 cords per acre; pine, 25 to 30; chestnut-rails are delivered at $4 to $6 per hundred; shingles, at $2.50 to $2.75 per M. Pine-lumber is in demand at $10 to $15 per M; chestnut-oak is very abundant on the mountains, but only utilized for the bark, which is delivered at $5 per cord; walnut-lumber brings $20 to $40 per M. *Nelson* reports one-half the area as in original forest, and one-eighth of the remainder in old-field pines. Of the latter, that of thirty years' standing is now very valuable, averaging 40 cords per acre, netting $50 to $75. The original forests average 70 cords per acre. Pine, poplar, and white-oak lumber is worth, at the mills, $10 per M. Chestnut is most valued for rails and shingles. Notwithstanding the great destruction of the forests in *Orange* during the war, timber of oak, chestnut, and locust still abounds. The products of the best forests are valued at $25 to $37.50 per acre. Since the war, much has been cut into lumber by steam-mills, and shipped. In *King and Queen*, wood of all kinds is being cut for the

market. Pine of original growth averages about 40 cords per acre, worth, standing, 50 cents to $2 per cord, according to proximity to the river. White oak for ship-timber sells for $6 to $10 per M; staves from red and white oak, for the Baltimore market, for $15 to $25 per M; rail-road-ties, at the vessel, for $40 to $60 per one hundred. From pine-timber land $50 per acre is realized. Two-thirds of the area of *James City* is in forest; consisting of pine, oak, chestnut, and cypress, with a sprinkling of other kinds. The pine is the most valuable, and is being rapidly cut into wood, shipped to New York, and plank shipped to Baltimore. Lumbermen have utilized, for staves and ship-timber, pretty much all the oak bordering upon the York, the James, and the Chickahominy. The destruction of forests by both armies during the war was very great in *Henrico*, but it still furnishes annually for Richmond fuel and lumber, amounting in value to $40,000 to $60,000. The principal timbers for market growing in *Middlesex* are oak, hickory, walnut, chestnut, cypress, and pine. Oak-forests average 40, and the best reach 60, tons per acre, and sell readily at $3 per ton on the stump. The yield of chestnut, which grows with great luxuriance, (a new crop replacing that cut in twenty years,) is better than that of oak. Pine-forest yields 40 cords per acre, worth, on the stump, 50 cents per cord. Cypress, growing in dense forests on the marshes of the Piankatank, is very valuable for shingles, and in many instances nets $100 per acre on the stump. There is in *Lee* more forest than cleared land, yielding 40 to 50 cords per acre, worth, standing, when it can be sold, 16 to 25 cents per cord. But there is little external market for either wood or lumber, from lack of transportation. Half the area in *Accomack* is in forest, principally yellow pine. About half of that is untouched, and will average 50 cords per acre. There are also large quantities of oaks and gum, with less of other varieties. Half the area of *Greenville* is also in forest, 25 per cent. of which yields 200 cords per acre. Its timber is mostly second-growth pine, though forests of original pine are yet extensive. Parts of the county produce black walnut and hickory in abundance. Fine oaks for timber are being recklessly cut for fuel. The price per acre is but little more than that of Government land. *Spottsylvania* has 60 per cent. of its area in forests, of which 10 per cent. is timbered land, valued at $20 per acre, and 50 per cent. land that will average 15 cords of wood per acre, worth 25 cents per cord, standing. The forests of *Tazewell* contain black walnut, poplar, white oak, and sugar-maple in abundance, and of very large size, but worth very little to the owners, owing to a want of mills and transportation. One-third the area of *Mecklenburgh* is in original forest, and another third in old-field pines. The former consists mainly of oak, hickory, poplar, and pine; and in the latter many trees large enough for timber, and some are set so thickly that one can scarcely work his way through. It is alleged that the more thoroughly the land is exhausted the more quickly and thickly the pines come up. It is estimated that 25 per cent. of the area of *Fairfax*, not including the old-field pines, is in forests, averaging 40 cords per acre, one-half of which is timber, including a large amount of yellow pine, and of oak suitable for ship-building. Tracts of forest, and many farms with more forest than needed for home use, are in the market at $10 to $20 per acre. The forests in *Henry* average 50 cords per acre, while the heaviest yield 100. One-third of the area is in forest, and timber of all kinds is abundant. Chestnut has been dying out for years, and there are fears that it will become extinct. The forests of *Northampton* are mostly of pine, interspersed with oak. The best will cut 50 cords per acre, the average being 30; standing wood is worth $1 per cord. In *New Kent*,

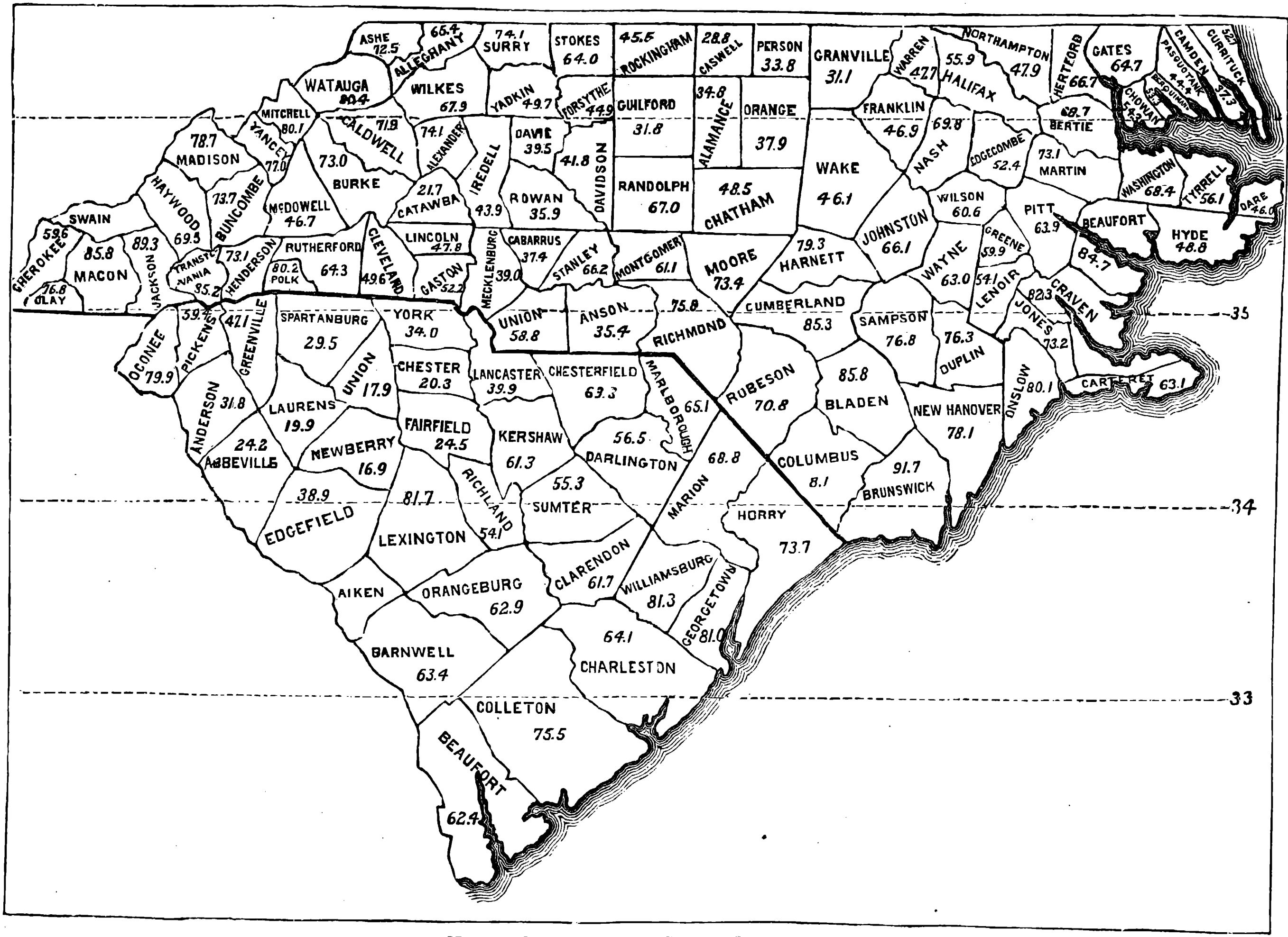
the pine-timber and wood near the river have been mainly cut for the northern market, but five miles back are extensive pine-forests that yield 30 to 50 cords per acre. *Buchanan* abounds in forests heavily timbered with hard woods, among which the oaks, poplar, and chestnut are prominent. These forests, remote from rafting streams, can be bought at 50 cents to $1 per acre.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Accomack	72,774	44.7	Lee	116,877	52.1
Albemarle	128,021	38.8	Loudoun	67,246	24.3
Alexandria	558	6.8	Louisa	101,120	39.7
Alleghany	87,013	78.7	Lunenburgh	60,101	26.7
Amelia	78,828	39.9	Madison	81,763	49.7
Amherst	96,182	41.7	Matthews	18,212	41.3
Appomattox	76,948	39.9	Mecklenburgh	127,125	38.1
Augusta	157,251	39.2	Middlesex	27,472	40.5
Bath	134,155	77.6	Montgomery	113,368	55.2
Bedford	131,480	36.1	Nansemond	106,161	65.2
Bland	86,146	74.1	Nelson	109,766	45.6
Botetourt	75,055	48.1	New Kent	41,758	53.5
Brunswick	192,683	70.4	Norfolk	49,288	47.3
Buchanan	....	....	Northampton	35,364	33.1
Buckingham	158,511	50.7	Northumberland	48,081	46.5
Campbell	136,045	46.5	Nottoway	75,056	51.9
Caroline	106,700	41.4	Orange	67,805	39.0
Carroll	136,110	70.2	Page	48,901	46.4
Charles City	51,737	54.8	Patrick	160,906	69.7
Charlotte	85,810	33.4	Pittsylvania	294,568	49.1
Chesterfield	102,651	51.5	Powhatan	56,025	43.2
Clarke	25,343	25.4	Prince Edward	54,214	28.9
Craig	63,839	70.1	Prince George	48,344	44.9
Culpeper	62,558	26.5	Princess Anne	52,127	51.7
Cumberland	56,444	38.5	Prince William	53,658	38.1
Dinwiddie	85,433	36.8	Pulaski	110,604	64.3
Elizabeth City	14,042	48.9	Rappahannock	42,695	33.6
Essex	63,291	40.5	Richmond	49,971	48.8
Fairfield	83,048	40.2	Roanoke	74,788	45.6
Fauquier	104,296	25.6	Rockbridge	110,252	51.6
Floyd	93,728	57.7	Rockingham	129,687	41.2
Fluvanna	57,683	40.1	Russell	132,391	64.0
Franklin	174,671	52.5	Scott	158,004	69.1
Frederick	75,603	36.0	Shenandoah	81,063	40.4
Giles	18,758	15.0	Smyth	87,138	59.9
Gloucester	49,400	46.3	Southampton	165,857	57.3
Goochland	62,512	31.5	Spottsylvania	68,652	40.3
Grayson	119,543	61.3	Stafford	72,166	54.9
Greene	38,518	46.9	Surry	60,428	59.7
Greenville	77,913	50.9	Sussex	97,876	52.2
Halifax	129,324	37.7	Tazewell	154,914	70.9
Hanover	100,523	42.1	Warren	40,778	42.0
Henrico	57,922	46.3	Warwick	20,369	62.5
Henry	86,888	48.8	Washington	178,014	53.6
Highland	116,766	68.5	Westmoreland	41,724	39.9
Isle of Wight	87,110	53.5	Wise	3,533	1.6
James City	28,530	61.7	Wythe	149,301	61.0
King and Queen	65,682	42.5	York	21,919	50.1
King George	38,837	38.2			
King William	57,919	35.4			
Lancaster	36,522	50.3	Total	8,294,734	45.7

NORTH CAROLINA.—Except the valley of the French Broad River, averaging about one mile in width, the area of *Transylvania* is mainly mountainous and covered with forest. Black walnut and cherry are among all other varieties of the climate. These forests can be bought at about $2 per acre, with a most healthy climate, water-power unsurpassed, and a railroad reaching the valley now under contract. In *Orange*, varieties of oak abound, with a mixture of other valuable kinds. The abandoned fields produce a new growth of pine in a few years, and it appears to restore the worn-out land. They are the main source of coal for the smiths and for curing tobacco. Forests some distance from town, heavily wooded with pine, oak, and hickory, sell for $15 to $16 per acre. Wood brings, in the towns, $2 to $3 per cord. *Haywood* re-

ports 80 per cent. of the area in forest, a great portion being mountainous. With few exceptions, heavy forests cover the mountains to the very top. In many instances timber is considered a nuisance and every means for its destruction resorted to—"even to piling it in huge piles and burning it to ashes." In *Caswell*, the average yield of forests per acre is reported at 200 cords. Pine and oak predominate largely. The old-field pines become large enough for ordinary building purposes in about twenty years. The forests in *Surry*, averaging more than 75 per cent. of the area, and yielding 40 cords per acre, contain yellow pine, oaks, black and white walnut, and other valuable timbers, but, owing to a want of railroad facilities, do not sell at more than $1 per acre. Large tracts of forest yet remain in *Duplin*, at a distance from the railroad, in which the most valuable timber is the long-leaf pine, yielding 10 M per acre. There are immense quantities of cypress, white oak, ash, and poplar in the swamps. *Yancey*, a mountainous county, reports vast quantities of very tall and heavy timber; including locusts, 2 to 3 feet in diameter; sycamore, 5 to 7 feet; sugar-maple, 3 to 4 feet; yellow poplar, 6 to 8 feet; also, plenty of buckeye-pine, spruce, and mahogany or mountain birch. In *Beaufort*, fully 80 per cent. of the land-area is covered with forests, one-half of which is of original growth. On the uplands, they consist mostly of the long and the short-stem pine, and on the lowland, of cypress, oaks, maple, ash, gum, etc. There are many saw-mills in the county occupied in sawing lumber for the northern and West India markets, to which, also, many millions of cypress shingles are annually shipped, yet it is estimated that at the present rate the timber will long continue unexhausted. Lumber at the mills sells at $4 to $4.50 per M. The forests in *Caldwell* abound in the oaks, hickory, chestnut, white and yellow pine, and poplar. They are worth from $1 to $10 per acre, according to accessibility. Wood sells in the towns at $1 to $1.50 per cord; in rural districts, at 60 to 75 cents. *Watauga* claims as heavy white-pine forests as grow in the United States, and heavy deciduous forests of valuable timber. Not less than 83 per cent. of the area in *Burke* is reported in primitive forest, much of it heavily timbered, with a mixture of the most valuable varieties. Wood, in market, is $1.50 per cord. Timbered lands lying three or four miles from town command $1 to $5 per acre. *Alamance* contains 60,000 acres in original forest, besides a vast amount of land covered with second growth in different stages. Land worn out and abandoned as worthless has been restored to its original fertility (it is claimed) by a growth of pine, much of which now affords suitable timber for building. Owing to the growth of pines, there is now more woodland in the county than at the close of the war. The average yield is 35 cords per acre. Including the old-field pines, 75 per cent. of the area of *Nash* is in forest. Among the timbers in the original forest the most valuable is the yellow pine. More than half the area of *Pasquotank* is covered with timber, among which pine is most abundant. Thousands of acres are covered with long-leaf pine of original growth, ranging from 2 to 6 feet in diameter, and mostly heart. Cypress is of a still larger growth, but not quite so plentiful. The county being very favorably situated as to facilities for getting timber to saw-mills and lumber to market, a large and lucrative lumber-business is steadily carried on. Half the area of *Lincoln* is in forest; oak, pine, and hickory predominating. The original forest-chestnut is rapidly failing. *Carteret* reports 5,000 acres in dense cedar forest, and the same number in oak, both being worth $25 per acre, but to be had at a lower rate; 4,000 or 5,000 in ash and other swamp-woods; but the greater portion of the forest-area in yellow pine. In *Person*, 33 per cent. of the land is heavily timbered with original

growth, chiefly heart-pine, oak, hickory, and walnut. Pine-lumber, at the mill, is worth $10 per M; oak, $20; and walnut, $25. The forest-lands are being rapidly cleared up for the purpose of growing fine yellow tobacco, the timber being usually burned on the land. *Wayne* estimates an area of 170,000 acres in forest, of which 132,800 are in pine, and 33,200 in oak, ash, gum, and cypress; average yield, 50 cords per acre, worth, standing, 50 cents per cord. *Mitchell* has abundant forests of chestnut, oak, poplar, hickory, locust, and white pine. Half the area of *Stokes* is covered with original forests, principally yellow pine, hickory, oak, poplar, and chestnut. As these forest-lands make the finest yellow tobacco, vast quantities of valuable timber are annually destroyed by belting, burning in log-heaps, &c. The report represents that good soil and cheap timber, fine water-power, iron, coal, lime, and marble, and a near prospect of a railroad through the county, afford an inviting opening to enterprising capitalists. The forest-lands of *Henderson* average 50 cords of wood per acre. Among the timbers, the most valuable are black walnut, worth, in lumber, $40 per M; cherry, $30; ash, $25. Pine, poplar, and hickory are very abundant, and sell at $10 to $15 per M. About 67 per cent. of the area of *Moore* is covered with long-leaf yellow pine, much of which affords lumber not excelled in quality. In the northwest portion of the county are deciduous forests, yielding 40 cords per acre. Not more than 17 per cent. of the area is in cleared land. Pine-land, valuable only for the timber near the railroads, sells for $2 to $3 per acre; more remote, $1 to $2. Hickory-lumber sells for $40 per M; poplar, $15 to $20; ash, $35. In *Lenoir* the oak has been mostly used up, and the pine-forests, from which turpentine was formerly manufactured on an extensive scale, are now principally used for mill-timber, fence-rails, and fuel. For these purposes the supply is ample. Only about 33 per cent. of the land in *Alexander* is improved. The forests are principally of oak, pine, and hickory, and in the larger part the oaks and pine are very heavy. In many localities timber can be had for the cutting. *Pamlico* reports itself one vast forest. Quantities of shingles from cypress and juniper are shipped selling at $2.50 to $4 per M. Pine and poplar are the only kinds sawed into lumber. Pine, in stocks at the mill, sells at $10 to $25; poplar, at about double that price. Other varieties are given away. Oaks constitute over half of the forests of *Rowan*. The principal other kinds are pine and hickory. Standing wood is worth 75 cents per cord, within two miles of the railroad; more remote, it is worthless, and huge quantities are rolled into heaps and burned. The yield is 25 to 50 cords per acre. The forests of *Madison* are reported as abounding in magnificent timber of all varieties common to the latitude—among the more valuable, black-walnut, butternut, and cherry. White pine and poplar seem inexhaustible; trees of the latter being 5 feet in diameter, and of the former 2 to 4 feet, and 150 feet high. Chestnut and locust of the finest quality are also superabundant. Frequently these forests of magnificent timber are worth $10 to $12 less than nothing per acre—that is, the owners pay at that rate for removing them from the land for cultivation. Large tracts of forests lying on the ridges in *Polk* are owned by a northern company, and held at $2 per acre. They are known as "speculation lands," and not regarded as very productive. In *Gaston*, it is still not uncommon in clearing land to kill a part of the timber by girdling, and cut and burn the remainder on the ground. Many of the old fields are densely covered with pines of thirty to forty years' growth. More than 67 per cent. of the area in *Randolph* is yet in forests, which, with a railroad through the county, would be very valuable. The northern part is principally timbered with oak and hickory, and the middle belt with pine and oak.



NORTH CAROLINA AND SOUTH CAROLINA.

In the western part of the latter are many saw-mills, some run by water and others by steam, cutting up large quantities of pine-lumber, which is shipped on the North Carolina Railroad. The price paid for timber on the stump by mill-owners is $1 per M. The southern portion is more heavily timbered than either of the others, chiefly in pine, but in some localities there is a heavy growth of oak. In *Gates*, the forests abound in pine-timber, worth about $4 per acre; and the swamps in cypress and juniper, which, with shipping facilities, would be valuable. The forests of *Cherokee* include a mixture of all woods common to the climate, among which oaks, hickory, chestnut, poplar, and pines are most prominent. Among the other kinds are black-walnut and cherry. The yield of the best forests is estimated at 100 cords per acre, worth, on the stump, ½ to 1 cent per cord. Forest-lands lying back and on the mountains sell at 25 cents to $1 per acre. In the forests of *Wilkes*, pine is the most valuable timber, worth $6 per M; after that, the oaks, hickory, locust, poplar, etc. The average yield of wood, 40 cords per acre. *Clay* reports that 80 per cent. of the area is in forests that will average 200 or more cords per acre, including all the valuable varieties of timber. About 67 per cent. of *Onslow* is in forest, principally of long-leaf pine. In *Tyrrel*, also, pine forests abound, with cypress, juniper, gum, oak, etc. *Davidson* has a large area in forests, which include all the varieties of oak, hickory, pine, poplar, birch, walnut, and chestnut. *Anson* reports, besides the oaks, immense quantities of yellow-pine all valuable for timber.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Alamance	77,701	34.8	Johnston	261,614	66.1
Alexander	94,459	74.1	Jones	82,360	73.2
Alleghany	86,135	65.4	Lenoir	95,926	54.1
Anson	76,392	35.4	Lincoln	70,400	47.8
Ashe	159,237	72.5	Macon	289,573	85.8
Beaufort	226,102	84.7	Madison	121,368	78.7
Bertie	196,850	68.7	Martin	168,603	73.1
Bladen	267,881	85.8	McDowell	27,620	46.7
Brunswick	259,626	91.7	Mecklenburgh	105,253	39.0
Buncombe	229,279	73.7	Mitchell	74,329	80.1
Burke	120,112	73.0	Montgomery	146,245	61.1
Cabarrus	65,981	37.4	Moore	265,704	73.4
Caldwell	151,827	71.9	Nash	146,560	69.8
Camden	27,735	37.3	New Hanover	270,059	78.1
Carteret	51,836	63.1	Northampton	132,115	47.9
Caswell	64,878	28.8	Onslow	157,705	80.1
Catawba	27,790	21.7	Orange	94,104	37.9
Chatham	204,466	48.5	Pasquotank	37,663	44.4
Cherokee	121,010	59.6	Perquimans	65,652	53.3
Chowan	44,179	54.3	Person	74,752	33.8
Clay	65,108	76.8	Pitt	190,271	63.9
Cleveland	106,019	49.6	Polk	68,429	80.2
Columbus	23,864	8.1	Randolph	289,540	67.0
Craven	265,673	82.3	Richmond	249,804	75.8
Cumberland	237,640	85.3	Robeson	313,699	70.8
Currituck	52,546	52.7	Rockingham	130,565	45.5
Dare	2,012	46.0	Rowan	92,263	35.9
Davidson	133,017	41.8	Rutherford	134,251	64.3
Davie	49,576	39.5	Sampson	323,429	76.8
Duplin	310,577	76.3	Stanley	114,000	66.2
Edgecombe	133,850	52.4	Stokes	124,593	64.0
Forsyth	93,640	44.9	Surry	154,359	74.1
Franklin	111,874	46.9	Transylvania	87,605	85.2
Gaston	103,455	52.2	Tyrrel	42,144	56.1
Gates	99,438	64.7	Union	191,847	58.8
Granville	116,483	31.1	Wake	183,247	46.1
Greene	87,153	59.9	Warren	139,070	47.7
Guilford	105,679	31.8	Washington	51,450	68.4
Halifax	204,841	55.9	Watauga	117,251	80.4
Harnett	163,499	79.3	Wayne	170,157	63.0
Haywood	82,545	69.5	Wilkes	209,009	67.9
Henderson	123,106	73.1	Wilson	98,972	60.6
Hertford	110,063	66.7	Yadkin	94,910	49.7
Hyde	25,028	48.8	Yancey	79,942	77.0
Iredell	116,077	43.9			
Jackson	208,243	89.3	Total	12,026,894	60.6

SOUTH CAROLINA.—In *Greenville* companies with steam saw-mills purchase forests at $10 per acre, saw the oak into fencing and railroad timber, and the pine into lumber, the latter selling at $12.50 per M, and then offer the land for farming at $10 per acre. Steam saw-mills, which have multiplied within two or three years, saw up all the lumber that can be obtained near the first location, and then remove to a new one. The demand for tan-bark, which is gathered in quantities, is increasing. Over 500,000 acres in *Lexington* are in forest, three-fourths of which are covered with yellow pine of the best quality. The remaining fourth contains short-leaf pine, cedar, and juniper, with varieties of the hard-wood timbers of great intrinsic value. The pine-lands average per acre about 7 M of lumber, worth $10 per M, and 15 cords of wood, from the tops, worth $1.50 per cord delivered along the railroad traversing the county, and there will be left an equal value in smaller trees suitable for rails and wood. Large quantities of pine-timber, hewn and sawed, are rafted down Edisto River to Charleston market. The best of shingles are delivered at the railroad at $3 to $4. Water-power is abundant and cheap. Several thousand acres have been boxed for turpentine, which is supposed to yield a handsome profit to those engaged in the manufacture. *Clarendon* has 60,000 acres in Santee Swamp, besides several inland swamps of less extent, all heavily timbered with cypress, oaks, sweet-gum, with some pine, etc. This timber as now situated is of little market value. The forests on the uplands are chiefly of yellow pine, three-fourths of which are boxed for turpentine, yielding an average of $1.50 per acre. This does not destroy the trees, though it lessens their value for timber. There is a large extent of old-field pines. About half the area of *Spartanburgh* is in original forest, and one-fourth in old-field pines, varying in diameter from 1 to 18 inches. Of the original forest-land, a large tract is covered with a dense growth of scrub-oak, on another hard pine predominates, and on a third, oaks and hickory from 1 to 3 feet in diameter. Forest-land near towns or the railroad may be bought at prices which the net profit on the forest cut off will repay, varying from $3 to $30 per acre. Of the area of *Newberry*, 50 per cent. is in old-field pines and cedars, and about 5 per cent. in original forest. Under the new growth the old fields "recuperate rapidly." A few persons yet living remember when there were but two cedar trees within an area thirty miles in diameter, on all the worn-out lands of which they are now growing thickly. On the uncleared land in *Williamsburgh*, except along the margins of streams and the railroad, the original forests remain untouched. The most abundant is of pitch-pine of two varieties, and, it is claimed, will yield as much valuable lumber per acre as any woodland in the world. There are also lowland forests of cypress, hickory, ash, poplar, and oaks. *Barnwell* reports 75 per cent. of the area in forest, and 75 per cent. of that in yellow pine, oak predominating in the other fourth. Along the streams is a heavy growth of oak, hickory, and cypress. The oak is being hewed into square logs and rafted to sea-ports. In *Beaufort*, on the Sea Islands, and along the shore, a heavy growth of oak and live-oak borders all the river margins and the sea-coast. The swamps are covered with black and white cypress, shingles from which are known to have lasted seventy years. But the larger area of the county is covered with a heavy forest of yellow and pitch pine, now being extensively utilized for lumber and turpentine manufacture. Forests of yellow and short-leaf pine cover about half the area of *Colleton*. The former yield per acre about 1,500 feet of the best of timber; the latter are principally utilized in the manufacture of turpentine, tar and rosin. Other forests are composed of oak, hickory,

cypress, etc. In *Richland*, the forests are pine, yielding 50 cords per acre or making 40 to 50 gallons of turpentine per acre. Delivered at the railroad wood is worth $2 per cord; lumber, $10 per M. In *Fairfield* the forests are oak and hickory, interspersed with pine, estimated to yield 35 cords per acre. The chief growth on the uplands in *Georgetown* is yellow pine used for manufacturing turpentine, mill-lumber, fuel, and staves for rice-tierces and rosin-barrels. The supply for turpentine will soon be exhausted. In the swamps, the chief timber is cypress. The consumption has been large in the manufacture of shingles for home use and export, and for which there is a steady market-value. Besides the manufacture in the swamps by hand, in which the waste of timber is great, a mill in the town of Georgetown turns out immense quantities from logs floated from the swamps during freshets. Oak, ash, gum, hickory, etc., abound in the swamps; but, in order to make the timber of much value, machinery must come to the material and skilled labor must be imported.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Abbeville	120, 602	24. 2	Laurens	64, 319	19. 9
Anderson	128, 447	31. 8	Lexington	309, 815	81. 7
Barnwell	715, 184	63. 4	Marion	350, 192	68. 8
Beaufort	341, 567	62. 4	Marlborough	156, 279	65. 1
Charleston	388, 830	64. 1	Newberry	48, 285	16. 9
Chester	59, 508	20. 3	Oconee	164, 304	79. 9
Chesterfield	238, 139	69. 3	Orangeburgh	299, 690	62. 9
Clarendon	186, 928	61. 7	Pickens	125, 619	59. 4
Colleton	437, 592	75. 5	Richland	127, 579	54. 1
Darlington	214, 904	56. 5	Spartanburgh	133, 014	29. 5
Edgefield	287, 646	38. 9	Sumter	166, 545	55. 3
Fairfield	88, 268	24. 5	Union	54, 511	17. 9
Georgetown	159, 214	81. 0	Williamsburgh	319, 949	81. 3
Greenville	137, 540	47. 1	York	105, 734	34. 0
Horry	281, 210	73. 7			
Kershaw	153, 876	61. 3	Total	6, 443, 851	53. 2
Lancaster	68, 561	39. 9			

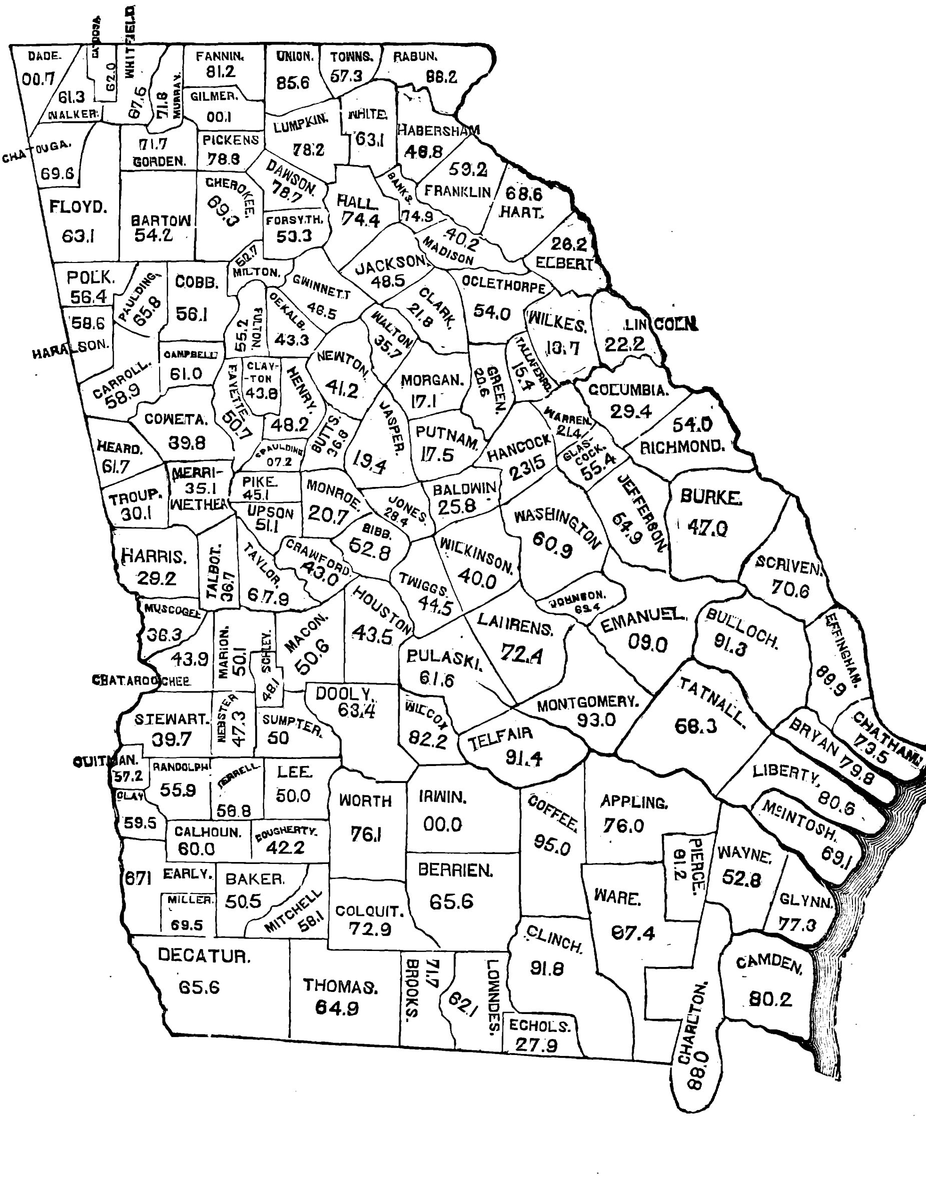
GEORGIA.—About 42 per cent. of the area of *Terrell* is in forest, mostly valuable yellow, heart-pine timber. The estimated average yield in wood is 75 cords per acre. This forest-land can now be bought very cheap. In *Effingham*, the forests of yellow and pitch pine are extensive, and in the swamps there is much valuable oak. Forest-land is worth $1 to $10 per acre. About 50 per cent. of the area in *Jackson* is in original forest and 10 per cent. in old-field pine. In the former, pine, oak, hickory, chestnut, and poplar trees are abundant, with other kinds interspersed. The original and old-field forests average, in wood, 20 cords per acre. The forests of *Houston* are about one-half of oak and hickory, the other half being of long-leaf pine. They average, in wood, 25 cords per acre. About one-half of *Fayette* is in original forest, in which oaks, hickory, chestnut, pine, and ash abound. The average price, including the land, is about $9 per acre. *Chatham* reports 75 per cent. of the area in forests, heavily timbered with pine, live-oak, cypress, hickory, gum, etc., and not salable at more than $6 to $10 per acre. In *Elbert* 50 per cent. of the area is in original forest, with an indefinite extent of old-field pine. The forests are a mixture of almost all kinds, but chestnut, during the last twenty years, has nearly died out. The estimated average yield in wood of the pine-forests in *Scriven* is 100 cords per acre. The swamps contain timber of the oaks, ash, hickory, walnut, cypress, etc. The forests in *Sumter* are of three grades: the upland, principally of oak and hickory; the pine forests, averaging 100 timber-trees per acre; and the swamp, abounding in white oak, gum, poplar, etc. The upland yields an average of 30 cords per acre; the

swamps, 40. The forests of *Carroll* abound in pine, the oaks, and hickory. Pine-timber sells to the lumbermen at an average of $3 per acre, and nets them an average of $6. But a small portion of the land is under cultivation. A railroad recently built to the center of the county has supplied a previous lack of transportation, and now a large number of steam saw-mills are in active operation. The forests contained a large quantity of chestnut, which began to die about ten years ago, and now scarcely a tree is left. Even the bushes are nearly all dead, though no insect or worm, or other cause affecting them, has been discovered. About 60 per cent. of the area in *Forsyth* is in original forest, principally pine, oaks, and chestnut—all fine timber. Forests cover 75 per cent. of the area in *Hall*, in which pine, the oaks, hickory, poplar, and gum are the prevailing timbers. Pine-lumber is dull of sale at $10 per M. "Pine-trees of good size sell at 30 cents per tree within one mile of a saw-mill." Until within a few years, chestnut abounded, but now nearly every tree is dead or dying. The return from *Early* estimates that there are 100,000 acres covered with yellow pine, and 65,000 with the oaks, ash, magnolia, gum, etc. There are also large quantities of cypress. *Johnson* reports 75 per cent. of the area, or 172,800 acres, in pine-forest, which would average 15 M per acre, and yet leave timber on the land for fencing. There is a market for only a very small portion, at $10 per M. There are, in addition, about 8,000 acres in mixed forest of oak, ash, and poplar. In *Camden*, there are 80,000 acres in pine-forest, averaging 3 M of lumber per acre. Near water for floating the logs, it is valued, standing, at $2 per M. There are about 12,000 acres in live-oak, one-half being on Cumberland Island, and 3,500 acres in cypress, both averaging 4 M per acre. It is estimated that annually 12,000 to 14,000 M (about half coming from Charlton County) are sawed in the county, two-thirds of which go to foreign markets. The entire area of *Pierce* was originally heavily timbered with yellow pine, about one-third of which has been sawed up. Timbered lands claimed to be the best in the State sell at $1 to $1.50 per acre, and the land, with the wood on it, after the timber has been removed, at 50 cents. In *Dawson*, 75 per cent. of the area is yet in original growth, in which pine is most abundant, chestnut next, and the oaks, hickory, black and white gum, and other kinds, more thinly interspersed. The estimated average in wood is 40 cords per acre. *Pulaski* reports that 83 per cent., if not more, of its area is primitive forest. The long-leaf pine is being cut out along the water-courses, floated into the river, and rafted to Darien, the great lumber-market. Saw-mills also are built along the line of the railroad, which passes through forests heavily timbered with pine, and by which the sawed lumber reaches market. On the Ocmulgee River are forests of heavy oak and cypress. The estimate of forest-yield is from 50 to 100 cords per acre. The mountain-forests in *Gordon*, largely of oak, and valuable for the bark, yield about 35 cords per acre, used principally for coal. The best forests, timbered with oak, pine, hickory, and poplar, average 50 cords per acre. Wood, standing, is worth 65 cents per cord. Hitherto there has been a reckless waste of the most valuable timbers, burnt in the fields. In *Stewart*, the uncleared lands are heavily timbered. Pine is most abundant, and next to that oak. There is a large extent of old-field pines. The forests in *White* abound in valuable oak and red-pine timber. Hard-wood timbers are also plenty. The present market-value is small, owing to a lack of facilities for transportation. The upland forests in *Dooly* are chiefly yellow and white pine, producing, per acre, 5 M of good heart-lumber, and selling at 50 cents to $1 per acre. As worked up by 8 saw-mills, it sells for home

use at $10 to $12.50 per M. No facilities for shipping. The swamp-land heavily timbered with cypress, noted for size and height. Oak, hickory, and other kinds can be bought for $1 per acre. *Marion* reports 53,586 acres in forest disconnected with farms, a portion of it good soil, with valuable timber, and a railroad passing through, and yet selling at 50 cents to $3 per acre. The forest-lands that are connected with farms are worth $10 to $15 per acre. In *Bartow*, 67 per cent. of the area is in forests of oak, hickory, chestnut, black walnut, and yellow pine. As tested by iron manufacturers, the average yield of wood per acre is 40 cords. In *Dodge*, 67 per cent. of the area is in forests of pitch-pine, hickory, oak, gum, etc., averaging, per acre, 7 M of lumber, and selling in market at $8 to $12 per M, which gives the lumbermen a profit of $2 to $4 per M. In *Richmond*, the sandy portion, being 95 per cent. of the timbered area, is covered with pine, black oak, and hickory; river-land, with a dense growth of cypress. Lumber from long-leaf pine, the quality equal to the best in the United States, is worth, at the mill, $13 per M. Well-timbered land, near the railroad, is worth $10 to $25 per acre; remote, will scarcely command $3. In *Warren*, not more than 10 per cent. of the area is in original forest, and perhaps 5 per cent. in second growth. The forests in *Brooks* are principally stocked with pine-timber, claimed to be as fine as the world produces, averaging fifty timber-trees per acre. The hummock-lands, near the water-courses, are timbered with oak, hickory, poplar, magnolia, cypress, etc. It is emphatically a county of valuable forests, but as yet not opened to market. *Fulton* claims over 100 varieties of timber, among which the most valuable are walnut, poplar, and pine. Within twelve months, over 500 cords of old-field pine-wood have been taken from a field of 20 acres turned out twenty-five years ago. One-fourth the area of *Schley* is covered with long-leaf pine, one-half of which is fit to convert into planks, and the other into timber for buildings, fences, &c. The salable value per acre is $5. The forests in *Walton* are of oak, hickory, and pine, yielding from 25 to 100 cords per acre. Chestnut has all died. Most of the lands are taking on a very heavy growth of old-field pine, and in a few years will be more heavily timbered than the original forests. One-half the southern portion of *McDuffie* is covered with original forest of yellow pine, poplar, maple, and sweet and black gum, with a heavy undergrowth of black and post oak. About 5 per cent. of the northern half is covered with original forest of oaks, hickory, and black walnut. These forest are valued at $40 to $50 per acre, and some lots of pine, converted into lumber and cord-wood, are known to have yielded as high as $100 per acre. *Talbot*, once heavily wooded, is now a very sparsely-timbered county; but, except for fencing and on the line of the railroad, timber has no value. The original forest in *Morgan* was of beautiful oaks, hickory, and other hard woods. "This was largely cut down and wasted during the cotton mania." The abandoned fields are now covered with old-field pine in different stages of growth. *Meriwether* is reported as abounding in all kinds of timber, and the quantity constantly increasing, owing to the large area of old-field pines. *Lincoln* contains about 30,000 acres in forests of oaks, hickory, and pine; 5,000 in long-leaf pine, worth $2 to $3 per acre, and 25,000 in oaks and hickory, worth $3 to $7. In *MacIntosh*, besides extensive swamps of cypress and white oak, pine forests occupy 67 per cent. of the area, yielding an average of 1,000 feet of timber for shipping, and 40 cords of wood per acre. On all the sea islands, live-oak suitable for naval purposes is found. The yellow-pine forests in *Montgomery* are estimated, by an experienced lumberman, to yield, per

acre, 10 M of merchantable lumber, worth, in the markets at Darien and Brunswick, \$7.50 to \$15 per M; and, in addition to this, a large quantity of smaller trees. It claims to be the best timbered in yellow pine of any region on the continent. In *Rabun*, a mountainous county, the average market-value of the forest-lands is placed at \$2 per acre. The principal timbers are the oaks, pine, poplar, chestnut, black locust, and black walnut. *Lumpkin* reports 90 per cent. of its area in forests of the same kinds, and ranging in price from 25 cents to \$10 per acre. The best quality of sawed lumber, delivered at Dahlonega, is worth \$12.50 to \$15 per M. In *Whitfield*, 75 per cent. of the area is covered with similar forests, (except that black walnut is not specified,) estimated to average in wood 200 cords per acre. Sawed lumber brings \$10 to \$12.50 per M; wood, standing, not more than two or three miles from town, 40 to 50 cents per cord. From that point, the price recedes until it passes beyond the less than nothing point so far that owners will pay \$10 per acre to have the forest removed. In *Liberty*, 75 per cent. or more of the area is in forest, principally of pine. Pines are being cut and shipped to foreign markets; also boxed for turpentine and rosin. The latter business, commenced within the year, promises to be enlarged. The cypress, white oak, live-oak, and other varieties of timber, with the old-field pines, make "timber enough to stand the pressure of civilization and population for five hundred years, if not for countless ages."* In *Pike*, the main forests are of pine, on the mountains, running through the southern part, from portions of which as much as \$50 per acre is realized for lumber taken off, besides leaving a smaller growth sufficient for fencing, &c. There are also many tracts heavily timbered with the finest white oak, hickory, poplar, gum, etc. The forests in *Jefferson* are chiefly of valuable pine, from which large quantities of lumber are shipped to domestic and foreign ports. Along the water-courses are forests; white oak, hickory, cypress, elm, and poplar. On the uplands, in *Troup*, the forests are of oak and hickory, with some yellow-pine and poplar, averaging, in wood, 35 cords per acre. Sawed lumber, of poplar, sells at \$20 per M; of pine, \$10 per M. The growth on the lowland is of white and willow oak, hickory, gum, and ash. Sawed oak is worth \$15 per M; gum, \$30; ash, \$25; wood, delivered, \$2.50 per cord. *Randolph* reports a large area in forest, principally pine, oak, and hickory, used only for fuel and fencing. More than half the area of *Franklin* is in original forest, in which are large quantities of pine, poplar, hickory, and walnut, with a sprinkling of other kinds. One-half the area of *Gwinnett* is covered with dense, original forest, of pitch-pine, oaks, and other timbers, and one-third of the other half with old-field pine. The best pine-tracts yield 100 to 150 timber-trees per acre, which, when near enough to a saw-mill, sell at 50 to 75 cents per tree; and, after removing these, other timber is left which would be worth as much more if there were any market. *Heard* reports very extensive forests of pine-timber; almost valueless for the want of transporting facilities. *Calhoun*, 110,000 acres in forest, mostly of pine, yielding, per acre, 20 M of lumber and 40 cords of wood; but valueless from inaccessibility to market. In the forests of *Upson*, pine largely predominates in the northern, and white oak, hickory, and poplar in the middle and southern portions, with almost every other kind interspersed. Sawed pine sells for \$12.50 per M. Over half the area is in original forest, and not a foot of lumber of any kind shipped out of the county. About three-eighths of the surface of *Taliaferro* is in forest. To this is to be added the old-field pines, rich in resin, which, in twenty years

* NOTE.—This depends on the degree of civilization and the numbers of population.



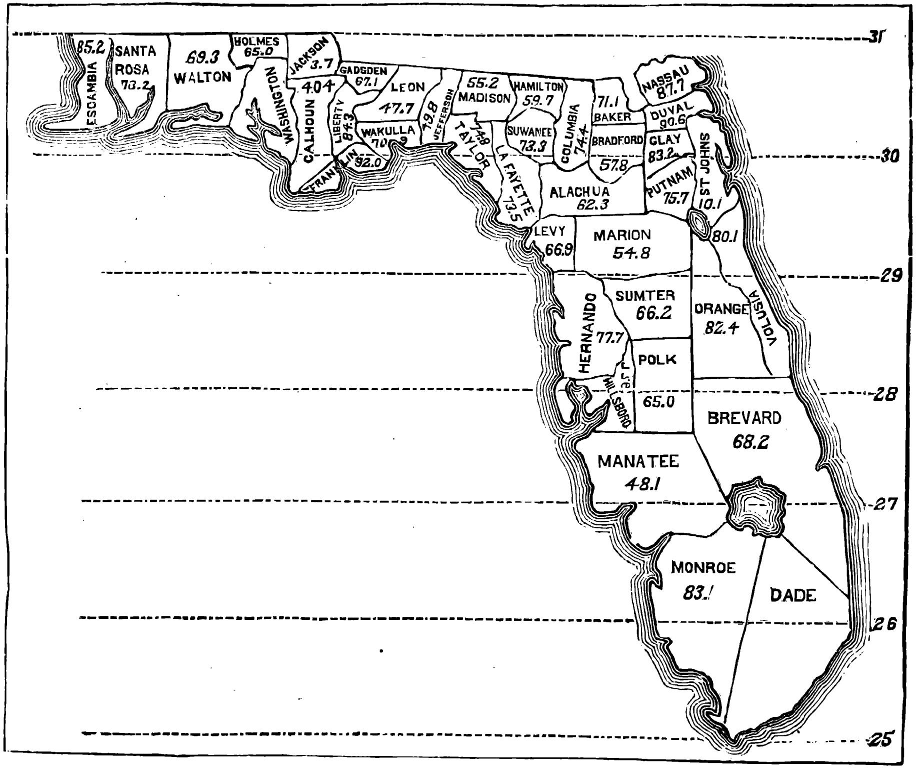
FOREST AREA OF GEORGIA.

from the time the old field was turned out, will yield 50 cords per acre. About one-third the area of *Hancock* is in forest, one-half of which is in primitive oak, hickory, and long-leaf pine; the other half in second-growth short-leaf pine. The original forests yield, in wood, 20 to 30 cords per acre, worth, in market, $2.50 to $4 per cord. About 20 per cent. of the area in *Harris* is in original forest, a mixture of all the prevailing kinds, and 40 per cent. in old-field pine. Pine sells for $10 per M; oak and other deciduous timber is higher. Land yielding 5 to 6 M per acre of good lumber sells at $1 to $8 per acre. As to lumber and water privileges, it is claimed that no county has better advantages for manufactories of all kinds. The estimated area in *Oglethorpe* is 8 to 10 per cent. in original forest, and 50 per cent. in old-field pine. The original forests include very valuable timber of different kinds, and are valued at an average of $20 per acre; the second growth, at $5 to $10. *Wilkes* has but little original forest. Sawed pine, for home consumption, sells for $10 to $15 per M. *Floyd* reports 75 per cent. of its area in forest, averaging 40 cords, in wood, per acre; mostly pine and oak. Near furnaces, towns, or railroads, standing wood is worth 10 cents per cord. The forests on lowlands are much heavier, averaging 100 cords per acre. Sixty varieties of wood have been found on one farm. *Murray* reports 80 per cent. of the area in native forest, containing a great variety of timber; pine, poplar, and the oaks, including live-oak, being prominent. *Dade* returned for taxation in 1875 25,119 acres in original forests of oak, hickory, elm, poplar, chestnut, and pine, with the usual sprinkling of other varieties. These lands, containing iron, coal, and lime, as well as timber, are worth, in market, an average of $5 per acre.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Appling	271,385	76.0	Echols	16,934	27.9
Baker	69,921	50.5	Effingham	174,478	89.9
Baldwin	25,779	25.8	Elbert	53,345	26.2
Banks	85,677	74.9	Emanuel	41,881	9.0
Bartow	136,322	54.2	Fannin	87,513	81.2
Berrien	147,885	65.6	Fayette	61,750	50.7
Bibb	71,851	52.8	Floyd	150,082	63.1
Brooks	155,198	71.7	Forsyth	33,417	53.3
Bryan	113,230	79.8	Franklin	108,566	59.2
Bullock	412,385	91.3	Fulton	37,998	55.2
Burke	159,830	47.0	Gilmer	250	0.1
Butts	42,161	36.6	Glasscock	45,142	55.4
Calhoun	84,255	60.0	Glynn	59,403	77.3
Camden	106,773	80.2	Gordon	125,884	71.7
Campbell	82,464	61.0	Greene	37,566	20.6
Carroll	104,851	58.9	Gwinnett	114,508	46.5
Catoosa	48,922	62.0	Habersham	19,887	46.8
Charlton	98,109	88.0	Hall	146,582	74.4
Chatham	94,412	73.5	Hancock	63,625	28.5
Chattahoochee	52,554	43.9	Haralson	57,647	58.6
Chatooga	94,837	69.6	Harris	87,251	29.2
Cherokee	120,676	69.3	Hart	82,446	68.6
Clarke	37,648	21.8	Heard	115,793	61.7
Clay	66,922	59.5	Henry	98,162	48.2
Clayton	20,775	43.8	Houston	130,125	43.8
Clinch	123,618	91.8	Irwin	....	....
Cobb	89,780	56.1	Jackson	102,961	48.5
Coffee	226,065	95.0	Jasper	48,712	19.4
Colquitt	60,766	72.9	Jefferson	135,347	54.9
Columbia	65,804	29.4	Johnson	48,964	69.4
Coweta	94,155	39.8	Jones	54,254	28.4
Crawford	66,521	43.0	Laurens	247,092	72.4
Dade	560	0.7	Lee	82,385	50.0
Dawson	103,263	78.7	Liberty	358,739	80.6
Decatur	184,342	65.6	Lincoln	30,341	22.2
De Kalb	68,800	43.3	Lowndes	204,563	62.1
Dooly	117,725	63.4	Lumpkin	74,325	78.2
Dougherty	76,488	42.2	Macon	95,093	50.6
Early	118,954	67.2	Madison	27,450	40.2

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Marion	85,455	50.1	Sumter	120,601	50.5
MacIntosh	61,337	69.1	Talbot	82,846	36.7
Meriwether	83,289	55.1	Taliaferro	15,170	15.4
Miller	68,270	69.5	Tatnall	266,096	56.3
Milton	38,893	52.7	Taylor	108,928	67.9
Mitchell	85,692	58.1	Telfair	232,822	91.4
Monroe	64,698	20.7	Terrell	78,605	56.8
Montgomery	278,187	93.0	Thomas	204,797	64.9
Morgan	26,050	17.1	Towns	36,220	57.3
Murray	88,939	71.6	Troup	71,877	30.1
Muscogee	44,116	36.3	Twiggs	113,574	44.5
Newton	89,350	41.2	Union	133,963	85.6
Oglethorpe	122,505	54.0	Upson	53,701	51.1
Paulding	69,524	65.8	Walker	114,772	61.3
Pickens	91,471	78.3	Walton	67,318	35.3
Pierce	101,243	91.2	Ware	267,093	97.7
Pike	76,957	45.1	Warren	43,299	21.4
Polk	50,431	56.4	Washington	275,632	60.9
Pulaski	168,040	61.6	Wayne	84,916	52.8
Putnam	33,029	17.5	Webster	45,415	47.3
Quitman	57,341	57.2	White	77,438	63.1
Rabun	128,018	88.2	Whitfield	93,125	67.6
Randolph	112,467	55.9	Wilcox	113,875	82.2
Richmond	48,800	54.0	Wilkes	39,452	13.7
Schley	50,557	48.1	Wilkinson	73,194	40.0
Scriven	197,512	70.6	Worth	107,757	76.1
Spalding	4,654	7.2			
Stewart	107,649	39.7	Total	12,928,084	54.6

FLORIDA.—The timber-forests in *Santa Rosa* are mainly pine; average per acre 1 M, worth $8 to $10 per M. Forests of oak, cypress, gum, &c., border the rivers and creeks. In *Orange*, yellow and pitch pine are the only timber-trees, averaging 2½ M of clear lumber per acre. Yellow pine of fine quality abounds on the uplands in *La Fayette;* on the hummocks, red cedar, hickory, cypress, etc. The county is about one hundred miles by forty, and one-third of the area heavily timbered hummock. Red cedar and pine logs are now being cut and shipped to Cedar Keys. There are 100 acres in forests of hickory, oak, and other hard woods to 1 under cultivation. One-third of the forests in *Liberty* are of yellow pine, on high ground, and two-thirds are of the kinds growing on hummock, river, and swamp lands. There is at present no demand, and, consequently, no price for lumber. *Nassau* is a timber county, principally covered with yellow pine, averaging about 5 M per acre, worth, in the stick, $8 to $10 per M, and sawed, $15 to $18. *Jackson* and *Holmes* report immense forests of pine and mixed timbers of great intrinsic but of scarcely any market value for the want of accessible markets. Forest-land in *Jackson* sells at $1.25 to $3 per acre. *Putnam*, with but a small part cleared, is heavily timbered with like forests; also *Clay*, in which 97 per cent. of the timbered land is pine, averaging, per acre, 1½ M of lumber, worth, standing, 25 cents per M, and 15 cords of wood, worth 1 cent per cord. The mixed forests include live-oak. *Suwannee* reports the yield at 60 M of sawed lumber, or 200 cords of wood. The prevailing kind in the mixture is long-leaf yellow pine. There are some fine groves of live-oak. In *Madison*, 25 per cent. of the area is covered with timber, of oak, hickory, &c., and 50 per cent. with the best of pine. The land and timber can be bought at $1 to $5 per acre. *Hamilton* claims forests equal to any in the State. In *Leon*, 90 per cent. of the land suitable for cultivation has been cleared, but some fine forests of yellow pine are left.



FLORIDA.

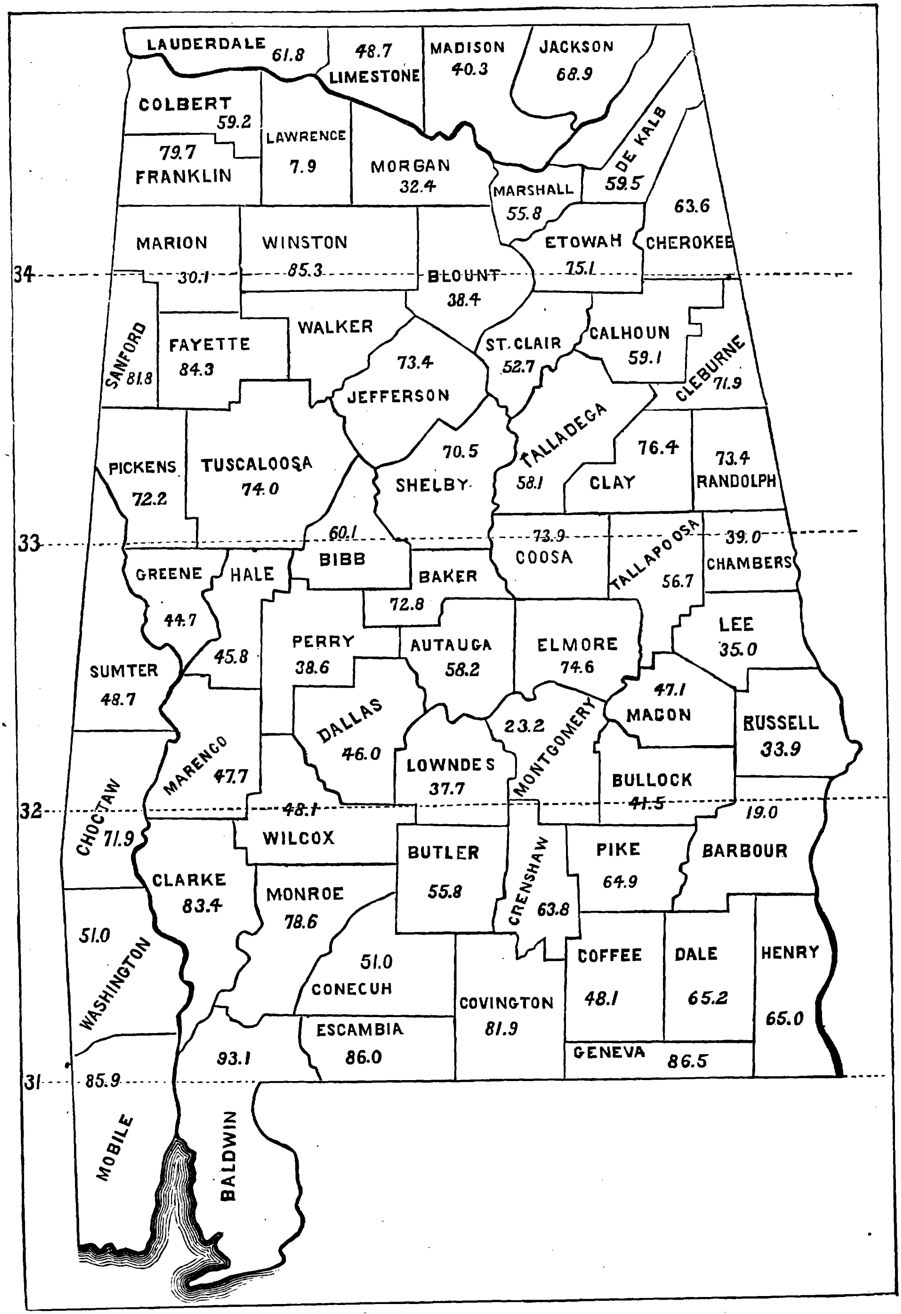
PLATE XXXVIII.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Alachua	146,776	62.3	Liberty	26,845	84.3
Baker	8,453	71.1	Madison	72,829	55.2
Bradford	33,362	57.8	Manatee	3,680	48.1
Brevard	11,555	68.2	Marion	175,832	54.8
Calhoun	7,904	40.4	Monroe	400	83.1
Clay	17,084	83.2	Nassau	39,466	87.7
Columbia	97,685	74.4	Orange	22,218	82.4
Duval	87,376	90.6	Polk	28,705	65.0
Escambia	6,236	85.2	Putnam	36,364	75.7
Franklin	2,736	92.0	Santa Rosa	4,821	73.2
Gadsden	135,218	67.1	Saint Johns	1,802	10.1
Hamilton	42,485	59.7	Sumter	31,528	66.2
Hernando	32,922	77.7	Suwannee	35,453	73.3
Hillsborough	21,626	77.6	Taylor	16,845	74.8
Holmes	10,168	65.0	Volusia	15,390	80.1
Jackson	4,698	3.7	Wakulla	35,435	70.9
Jefferson	81,634	49.8	Walton	18,260	69.3
La Fayette	19,311	73.5	Washington	....	....
Leon	81,325	47.7			
Levy	11,359	66.9	Total	1,425,786	60.0

ALABAMA.—About 17 per cent. of *Calhoun* is heavily timbered, principally with long-leaf pine, yielding 25 to 75 cords, in wood, per acre, worth, in the forest, 20 cents per cord. The usual variety of oak and other deciduous woods grow along the creeks. *De Kalb* has very little pine, the forests being a mixture of hard-wood varieties. The mountains and ridges are mostly covered with untouched original forests, though large quantities of chestnut-oak are being cut for the bark; about 33 per cent. of the area in the valleys is covered with culled forest. *Jackson* estimates the products of forests at 50 cords per acre. The maximum circumference of well-proportioned poplars is 45 feet 5 feet from the ground. *Blount* reports over 400,000 acres in forest, averaging 1 M of lumber and 40 cords of wood per acre. Some acres would yield 20 M of lumber and 100 cords of wood. The forests of *Winston*, abounding in almost all varieties of hard and soft timber, are valued at an average of $1.25 per acre. *Franklin* also has vast quantities of superior cedar and pine timber, as well as all varieties of oak, etc., and chestnut, of little value at present. On the other hand, the second county north of Franklin, *Lauderdale*, half covered with like forests, values the wood and timber bordering the Tennessee River, a highway to market, at $100 per acre. Several steam-mills in the pine forests are working up lumber for shipment, in large quantities. The opinion that, owing to rapid reproduction, the supply is inexhaustible, is enforced by the statement that lands cut off thirty years ago are now covered with "immense forests of timber large enough for all practical purposes." About 90 per cent. of *Randolph*, or 518,000 acres, is in forests, heavily timbered with all the varieties common to the State, valued at $1 to $25 per acre. Vast quantities are annually rolled into heaps and burned. *Clay* estimates that about 75 per cent. of the area is in forest, 50 per cent. of which is thickly timbered with oak, hickory, and poplar, while in some tracts pine is almost the exclusive growth. *Marengo* has much red cedar, worth, standing, at least $20 per acre. Along the Black Warrior River are oak forests, yielding 50 cords per acre, but of little money-value at present. The southern half of *Hale* has only wood enough for its own supply, but most of the northern half is still covered with forests, chiefly of pine and oak. The average yield of forests in *Greene* is placed at 15 cords per acre, worth, in the tree, 40 cents per cord. The swamps are timbered with oak of superior quality. Though there is easy access to Mobile, no lumber is manufactured for market. In *Bullock*, there are not less than 10,000 acres in

swamps, stocked with a heavy growth of very valuable timber—ash, cypress, tall white oak, and hickory. The uplands are well timbered with the usual varieties. Merchants and planing-mills pay at the rate of $2.25 per cord for timber, which is the price of wood. The swamps average 175 cords and the uplands 35 to 40 per acre, the average for the whole county being placed by mill men at 85. Among the forests are tracts of excellent pine timber. It is claimed that the county offers strong inducements to manufactories which consume lumber, there being no lack of railroad facilities. *Coffee* is well supplied with all kinds of timber grown in the South. Pine forests, unsurpassed in quantity and quality, are now being cut, hewn into square logs, or sawed parallel, and rafted to Pensacola, where an average of 15 cents per cubic foot is obtained. *Barbour* has tracts of pine-forests very heavily timbered, and extensive swamps covered with the usual varieties; within an area around Clayton, having a radius of six miles, are over 25 saw-mills in successful operation. In the prairie portion of *Perry*, wood is comparatively scarce, and worth $4 per cord; 50 per cent. of the remaining portion is covered with heavy primeval forests of mixed timbers. Pine-lumber sells at Marion at $25 per M, and wood at $2 to $3 per cord, and yet $5 to $15 per acre is paid for removing the wood and timber from land for cultivation. There are large tracts of pine-forests on public lands within fifteen to twenty miles of Marion. In *Conecuh*, 50 per cent. of the area, or 262,115 acres, is in forest. One-fourth of this is primeval, of which 60 per cent. is pine; another fourth is old-field pine. The pine is being extensively manufactured into square and sawed timber and rafted to Pensacola, where it brings 3 to 30 cents per cubic foot. The wood has no value except on the railroad, where it sells at $1.50 per cord. Timber-land sells at $1 to $5 per acre. About 50 per cent. of the area in *Montgomery* is covered with forests, in the southern part, of long-leaf pine, yielding per acre 5 M of the first class of merchantable lumber. Swamps densely stocked with all the varieties common in the South occupy 5 per cent. of the area. These timbered lands, averaging at least thirty good timber-trees per acre, some of them lying along the Mobile and Montgomery Railroad, can be bought at $3 to $8 per acre. *Covington* is heavily timbered, the principal kind being pitch pine, very large and valuable. In the swamps and along the rivers are heavy forests of mixed timber. It is estimated that out of the 806,400 acres, about 691,000 are in forests, yielding equal to the best. Lumbering in hewn and sawed timber, rafted down the rivers to Escambia Bay, for the European market, has been the principal business in the county for the last ten years. The quantity manufactured in 1875 is estimated at 1,968,000 cubic feet, valued at $196,000; which, owing to depression in demand and prices, was little more than half the quantity in 1873. About 75 per cent. of *Crenshaw* is covered with forests, principally long-leaf pine, which would be very valuable with means for getting it to market. There are extensive swamps and other tracts covered with heavy forests of mixed timber. The original forests have been mostly cut off in *Dallas*. The second growth on old fields is of pine, sassafras, persimmon, honey-locust, etc. There is no market value for forest, except near Selma, where standing wood is worth 50 cents per cord. In *Lowndes*, the lowlands and sandy uplands, the latter being 50 per cent. of the area, are well timbered with mixed forests. Some pine is sold for fuel along the railroad, and some oak transported to the sea-coast for ship-building. With these exceptions, the forests have little market-value. Lands in forest are worth $5 to $20 per acre. The north section of *Butler* was originally densely timbered with oak and hickory, and though much has been cleared off, an abundance is left; white oaks

PLATE XXXIX.



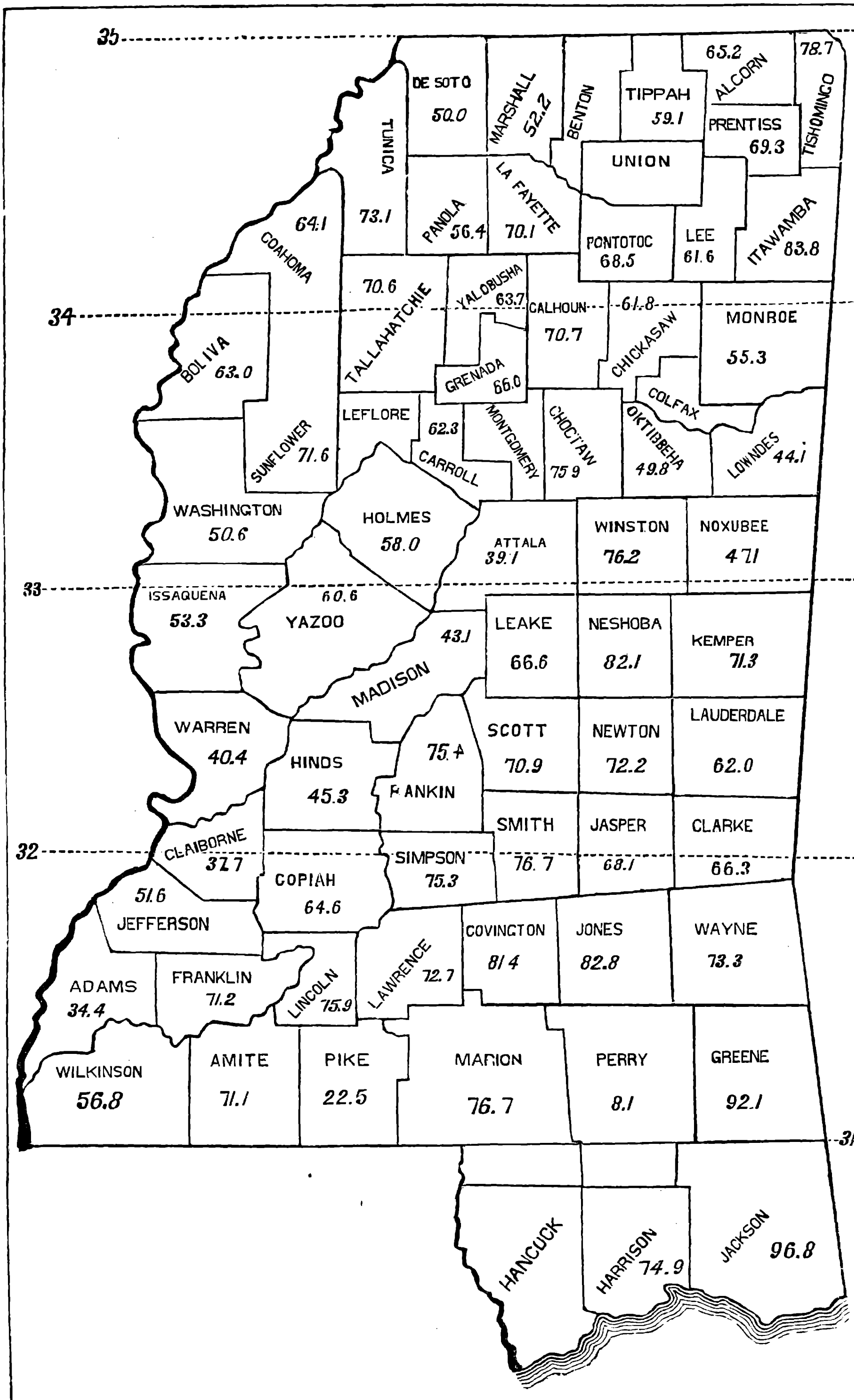
ALABAMA.

and poplars 5 to 6 feet in diameter. The south half is principally a pine forest, and abounds in saw-mills. Many spars are cut, some 80 feet in length. Standing trees, suitable for these, sell at $5 to $10 each. Square-hewn cedar, delivered at the railroad, sells at 30 cents per cubic foot; white oak and pine, 15 cents. Nearly 80 per cent. of the area of *Choctaw* is covered with long-leaf and short-leaf yellow pine, with nearly all varieties of oak and gum, some walnut, and large quantities of cypress. "These forests, vast in area and quantity, would be of immense value with capital and enterprise to develop them." *Clarke*, bounded by navigable water on all sides except the northeast, abounds with many kinds of valuable timber, such as cypress, cedar, white oak, hickory, and, exceeding all, yellow pine, unsurpassed in value. All kinds sell at low rates. *Marion* reports 550,000 acres of land, of which about 200,000 have been purchased from the Government, and 75,000 acres cleared. The most valuable kinds are pine, oak, and chestnut. Timber is of scarcely any value, not being exported in any form.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Autauga	139, 033	58. 2	Jefferson	186, 813	73. 4
Baker	108, 578	72. 8	Lauderdale	157, 142	61. 8
Baldwin	77, 487	93. 1	Lawrence	24, 528	7. 9
Barbour	76, 361	19. 0	Lee	105, 122	35. 0
Bibb	63, 931	60. 1	Limestone	116, 165	48. 7
Blount	93, 652	38. 4	Lowndes	105, 699	37. 7
Bullock	117, 423	41. 5	Macon	116, 379	47. 1
Butler	112, 385	55. 8	Madison	100, 390	40. 3
Calhoun	125, 071	59. 1	Marengo	176, 197	47. 7
Chambers	128, 314	39. 0	Marion	34, 734	30. 1
Cherokee	117, 983	63. 6	Marshall	75, 593	55. 8
Choctaw	220, 329	71. 9	Mobile	94, 287	85. 9
Clarke	310, 898	83. 4	Monroe	224, 282	78. 6
Clay	121, 856	76. 4	Montgomery	90, 692	23. 2
Cleburne	117, 855	71. 9	Morgan	79, 896	32. 4
Coffee	80, 199	48. 1	Perry	82, 186	38. 6
Colbert	108, 875	59. 2	Pickens	199, 525	72. 2
Conecuh	56, 977	51. 0	Pike	202, 379	64. 9
Coosa	199, 799	73. 9	Randolph	184, 289	73. 4
Covington	65, 203	81. 9	Russell	93, 934	33. 9
Crenshaw	131, 262	63. 8	Sanford	224, 381	81. 8
Dale	163, 156	65. 2	Shelby	138, 544	70. 5
Dallas	193, 366	46. 0	Saint Clair	72, 010	52. 7
De Kalb	67, 457	59. 5	Sumter	138, 424	48. 7
Elmore	233, 684	74. 6	Talladega	118, 821	58. 1
Escambia	49, 222	86. 0	Tallapoosa	155, 551	56. 7
Etowah	124, 545	75. 1	Tuscaloosa	238, 371	74. 0
Fayette	221, 489	84. 3	Walker	75	....
Franklin	169, 902	79. 7	Washington	40, 915	51. 0
Geneva	81, 899	86. 5	Wilcox	178, 325	48. 1
Greene	109, 650	44. 7	Winston	103, 936	85. 3
Hale	142, 083	45. 8			
Henry	211, 183	65. 0			
Jackson	179, 640	68. 9	Total	8, 380, 332	56. 0

MISSISSIPPI.—In *Clarke*, the forests are principally of pines and oaks. *Carroll* reports 80 per cent. of the area uncleared. On the hill-lands are principally oaks, pine, and hickory, while the dense forests of very large and tall trees on the Yazoo and Big Black Rivers have also large quantities of gum, poplar, and cypress. In *Warren*, forest-lands in the valleys of the Mississippi, Yazoo, and Big Black Rivers are valued at $10 per acre. The forests in *Perry* are mostly on the uplands, and of pitch and yellow pine. Pine-timber is being cut and rafted to mills on the coast, where it sells at $5 to $6 per M feet, and is mostly shipped to foreign ports. Forest-lands sell at 50 to 75 cents per acre. *Jones* is reported as "one dense forest of pine, except on the small streams, where oak, hickory, and gum abound." The pine forests average 12 M per acre, worth $6 per M at the mill. Four-fifths of the pine-lands are public. In the center of *Wilkinson* there are about 139,000 acres in forest, called "the pine woods," the larger part being long-leaf yellow

pine, but abounding also in short-leaf pine and oaks. Much of this belongs still to the United States. It yields from 100 to 400 cords per acre, and can be bought for $1.25 to $8 per acre. There are 70,000 acres in swamp forests of mixed timber, yielding 50 to 300 cords per acre, and selling at $5 to $50 per acre. In addition, there is a belt of forest across the southern end of the county, about 211,000 acres, made up of all varieties of trees known to the climate, including six of magnolia. Much of the timber is represented as unsurpassed in magnitude and perfection, yielding 100 to 500 cords per acre, and selling at $2 to $25 per acre. "Land uncultivated, but protected for a few years, becomes covered with a dense, rapid growth of timber of many kinds." In *Lauderdale*, 80 per cent. of the area is estimated as in forest. Four-fifths of this is in pine. Within two miles of the railroad, standing wood is worth 50 to 75 cents per cord; farther back, it is of no value. Nearly one-third the area of *Holmes* is covered with heavy swamp forests. Some lots of cypress of 5 to 10 acres yield 100 to 500 M of lumber, worth $23 to $30 per M. These forests sell for $6 to 10 per acre. In *Jefferson*, the forests are of mixed timber, and at present have little or no money value. Timber grows with such thrift that old fields, fenced in, will, in ten years, be retimbered for all farming purposes. *Le Flore* reports 80 per cent. of its area in native forests of mixed timber, averaging 40 cords per acre. *Rankin* reports 75 per cent. in wood, amounting to about 450,000 acres, heavily timbered. The leading variety is pine, large tracts of which, still owned by the Government, yield 10 to 25 M of lumber per acre. In *De Soto*, the forests on the bottom-lands yield 50, and on the hills 35, cords of wood per acre, worth on the railroad $3 per cord. White oak and hickory timber are found in large quantities. *Bolivar* is reported as one dense forest, with a few clearings, including immense quantities of cypress, cottonwood, ash, the gums, and all the oaks, except live-oak. About 80 per cent. of the area of *Washington* is yet covered with a dense growth, chiefly of hard woods and cypress. The trees are from 3 to 5 feet in diameter. Gum-trees predominate. The average yield is 65 to 70 cords per acre. In *Winston*, the forests on the ridges are mostly of pine, oak, and chestnut; on the bottoms, gums, beech, and maple. Timbered land yields 20 to 30 cords, and sells at 50 cents to $3 per acre. Owners often give the timber for clearing it off. In *Yalabusha*, forests on the hills yield 25 to 30, and on bottoms 35 to 40 cords per acre; in the eastern section, they are chiefly of pine. Wood over two miles from the railroad will not pay for hauling. The best forests in *Kemper* yield 50 to 100 cords per acre. They are not utilized, except for home use and for wood along the line of the railroad, where it sells at $2 per cord. The usual varieties of forest timber are abundant in *Greene*, large amounts of which are being cut and rafted down the Pascagoula River. *Jackson* reports that 90 per cent. of the area is timbered with pitch-pine, averaging about 60 trees, equal to 36 M of lumber per acre. Forest-lands sell at $1 to $5 per acre, according to location. The forests in *Pike* are mixed, yielding 40 to 60 cords per acre, worth, standing, $1.25, or $2.50 to $3 delivered. In *La Fayette* the hills are covered with oaks, some chestnut and hickory being interspersed, averaging about 30 cords per acre. The bottom-lands, estimated to yield 100 cords per acre, are timbered with magnificent white oak, gum, and hickory, with occasional cypress brakes. Growth is so rapid that forests cut off will be restored in twenty years. "The cost of transportation prevents export, and though there is plenty of the best of timber for manufacturing wagons, farming-utensils, &c., all these are now imported from the West." In *Grenada*, a large portion of the valley of the Yalabusha, twenty-five miles long, and varying from

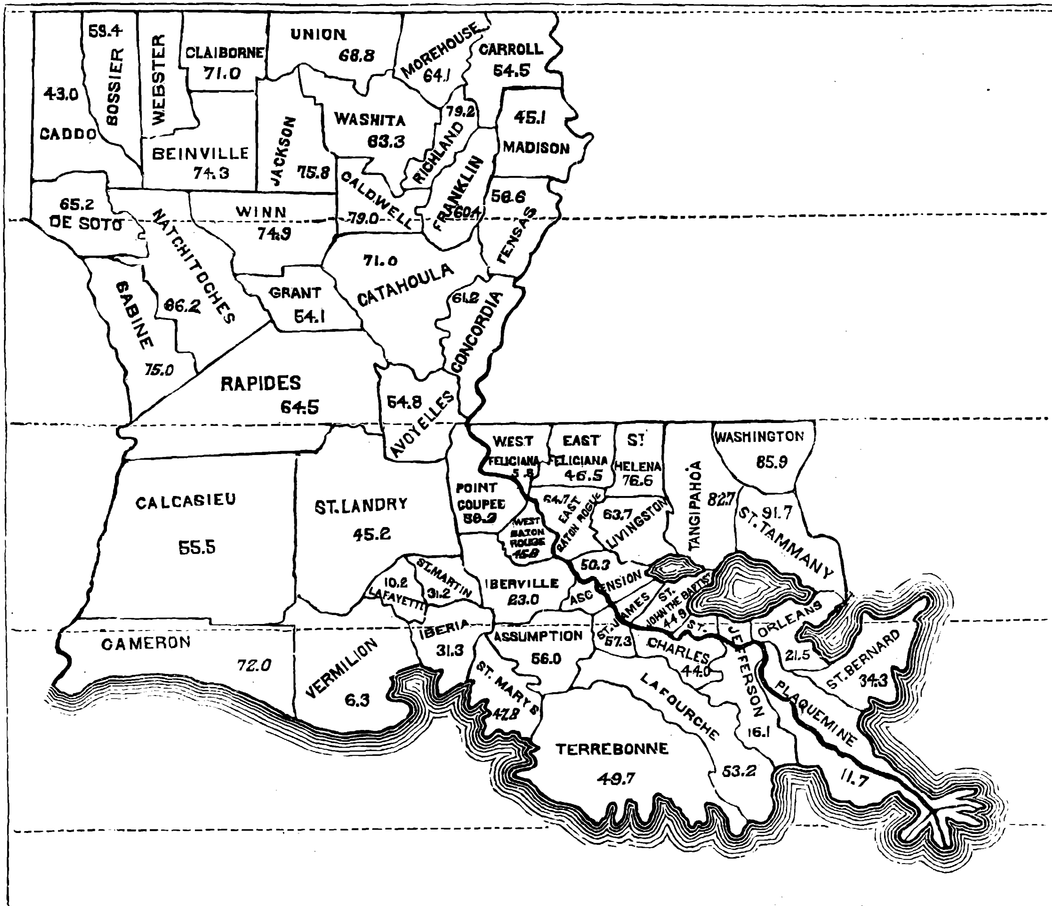


MISSISSIPPI.

three-fourths to one-half mile in width, is covered with thickly-set timber and large-sized oaks, poplar, hickory, and white gum, with some long-leaf pine; another valley, about fifteen miles long and from one-half to one mile wide, is covered with like forests. These lands command $8 to $10 per acre. All other parts of the county are abundantly supplied with timber and wood for home use. *Lowndes* is divided nearly in the middle by the Tombigbee. About 20 per cent. of the area on the west is covered with hard-wood timbers, yielding 150 cords per acre; about 50 per cent. on the east with pine, oak, hickory, walnut, elm, and cypress, yielding 100 cords per acre. Pine and cypress lumber are worth $15 per M. *Hancock* reports that nearly the whole area is one immense forest, including 210,000 acres in pitch pine and 11,000 acres in oak. The pine averages 4½ M of lumber, or 200 cords of wood, per acre; the oak, 85 cords of wood, "or 25 to 60 large live-oak knees." The pine-land is worth, for cord-wood, $6, or, for charcoal, $5, per acre; the oak, for ship-timber, $75 to $250 per acre. In *Smith*, the forests—a mixture of pine and the usual varieties of hard wood—average 25 cords per acre. The forests are also mixed in *Lee*, where the best pine-lumber sells for $10 per M. Walnut and cherry are higher. Forest-lands sell at $1 to $10 per acre, according to quality of soil, that being the chief consideration. In *Newton*, about 50 per cent. of the timber is pine, 25 per cent. of the area being covered with dense forests of yellow pine of superior quality. The value is merely nominal. It is estimated that the pine and sweet-gum in the county, converted into lumber, would supply the city of New York for several years. *Tunica* claims, at least, 50,000 acres of cypress. Near the Mississippi cottonwood predominates, yielding 50 to 200 cords per acre. Hickory, walnut, oak, and coffee-bean are among the other varieties, all now valueless, for the want of enterprising capital. In *Adams*, an old county, only about 10 per cent. of the area remains in forest, and from that the best timber has been cut.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adams	107, 093	34. 4	Lincoln	127, 035	75. 9
Alcorn	95, 447	65. 2	Lowndes	119, 206	44. 1
Amite	218, 181	71. 1	Madison	162, 232	43. 1
Attala	117, 941	39. 1	Marion	80, 220	76. 7
Bolivar	67, 583	63. 0	Marshall	234, 371	52. 2
Calhoun	178, 590	70. 7	Monroe	152, 915	55. 3
Carroll	223, 800	62. 3	Neshoba	159, 616	82. 1
Chickasaw	163, 977	61. 8	Newton	145, 093	72. 2
Choctaw	265, 485	75. 9	Noxubee	143, 999	47. 1
Claiborne	100, 650	37. 7	Oktibbeha	90, 973	49. 8
Clark	31, 458	66. 3	Panola	152, 668	56. 4
Coahoma	58, 026	64. 1	Perry	6, 308	8. 1
Copiah	222, 419	64. 6	Pike	13, 407	22. 5
Covington	94, 919	81. 4	Pontotoc	161, 986	68. 5
De Soto	209, 933	50. 0	Prentiss	105, 624	69. 3
Franklin	155, 531	71. 2	Rankin	174, 616	75. 4
Greene	53, 234	92. 1	Scott	106, 484	70. 9
Grenada	115, 695	66. 0	Simpson	77, 875	75. 3
Hancock	10	....	Smith	103, 233	76. 7
Harrison	3, 213	74. 9	Sunflower	81, 455	71. 6
Hinds	168, 470	45. 3	Tallahatchee	107, 394	70. 6
Holmes	143, 257	58. 0	Tippah	244, 202	59. 1
Issaquena	42, 688	53. 3	Tishomingo	129, 860	78. 7
Itawamba	154, 982	83. 8	Tunica	49, 906	73. 1
Jackson	51, 738	96. 8	Warren	109, 528	40. 4
Jasper	161, 669	68. 1	Washington	118, 318	50. 6
Jefferson	113, 038	51. 6	Wayne	33, 768	73. 3
Jones	75, 935	82. 8	Wilkinson	110, 120	56. 8
Kemper	141, 850	71. 3	Winston	128, 319	76. 2
La Fayette	245, 674	70. 1	Yalabusha	101, 778	63. 7
Lauderdale	72, 420	62. 0	Yazoo	209, 438	60. 6
Lawrence	101, 625	72. 7			
Leake	116, 373	66. 6			
Lee	143, 913	61. 6	Total	7, 959, 384	60. 6

LOUISIANA.—Large portions of the parishes of West Baton Rouge, Iberville, Assumption, La Fourche, Terre Bonne, Saint Mary's, Iberia, Saint Martin, and Saint Landry constitute what is known as the great cypress swamp. It is all below the high-water line of the Mississippi River, protected from overflow by levees. In the inundation of 1874 the highest lands in it were 4 feet, while the tide-water lands were 14 feet under water. It is estimated that if these timber-lands, now comparatively valueless, could be protected by sufficient levees, enough land would be redeemed to make 1,000 sugar-plantations, each capable of producing annually crops averaging in value $10,000, or a total of $10,000,000. The eastern part of *Iberia* is covered with a thick growth of cypress of the finest quality, with live oak and other swamp varieties intermingled. On the margins of all the streams are heavy growths of hard-wood timber, including live and water oak. In the swamps of *Saint Mary's*, the cypress trees are very close, and grow to the height of 80 or 90 feet, producing three hundred dollars' worth of lumber to the acre. Other swamp varieties, including live-oak, are interspersed. The forests on the high lands are of sweet-gum, hickory, live-oak and other oaks. In *Concordia*, cypress-timber is worth $8 per M in the log, or $20 sawed. Large quantities of cottonwood are being cut and sold to the steamboats, at $1.50 to $2 on the river bank. There is also a heavy growth of ash, which sells, delivered, at $2 to $2.50 per cord. *Red River* is heavily timbered; on the uplands with pine and oaks, on the lowlands with cypress, ash, and cottonwood. Cypress-lumber sells at $20 per M; pine, at $15; ash-wood, on the river bank, at $2 per cord. In *Madison*, the forests are all on the lowest lands. They are heavily timbered with ash, hackberry, and gum, with brakes or swamps of cypress. They are not valued above $2 per acre. The forests in *Carroll* are of the same character, and not utilized at present except for fire-wood, though the timber is of great intrinsic value. There are in *Franklin* 450,000 acres in forests, averaging 40 cords per acre. They include all varieties of oak, except live oak, ash, hickory, gum, pecan, and short-leaf pine. Owing to lack of transportation, both timber and wood are only of nominal value. *Avoyelles* contains about 300,000 acres of forest, in which the oaks, except live-oak, prevail; about 100,000 acres in cypress, 50,000 in magnolia, and as many more in hickory. Cypress-lands sell at $2 to $25 per acre. *East Baton Rouge* reports that 75 per cent. of the area is in forest. The bottoms are timbered with the usual swamp varieties; the uplands, with magnolia, sweet bay, black walnut, the oaks, etc.; and the sandy lands, in the northeast, with pine. *Morehouse* reports 402,963 acres in forest of which 11,700 are in cypress, worth $12 per acre; 130,000 in pine, $15 per acre, and about 33,000 in oak, $10 per acre. The remainder, suitable for wood only, averages 22 cords per acre. The northern half of *Bienville* is densely covered with forests of pine, mixed with oak and other hard-wood timbers. In the southern half, the forests are almost exclusively of long-leaf pine. The only forests in *Cameron* are a few islands of live oak and some tracts of pine and cypress in the northern part. In *Caddo*, the forests are of oaks and yellow pine, and valued at $5 per acre. *East Feliciana* reports 75 per cent. of its area in forests of pine and oak, with other varieties intermixed. The estimated yield is 100 to 150 cords per acre. The forests in *Jackson* yield all the common varieties of timber, excellent in quality, but of little available value, for want of market.



LOUISIANA.

PLATE XLI.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Ascension	40,718	50.3	Orleans	3,120	21.5
Assumption	52,854	56.0	Ouchita	70,880	63.3
Avoyelles	67,952	54.8	Plaquemines	15,813	11.7
Bienville	180,274	74.3	Point Coupee	48,556	39.2
Bossier	114,579	59.4	Rapides	145,912	64.5
Caddo	86,647	43.0	Richland	66,026	79.2
Calcasieu	9,247	55.5	Sabine	51,214	75.0
Caldwell	61,295	79.0	Saint Bernard	10,591	34.3
Cameron	8,538	72.0	Saint Charles	16,734	44.0
Carroll	71,815	54.5	Saint Helena	115,810	76.6
Catahoula	128,772	71.0	Saint James	59,762	57.3
Claiborne	323,256	71.0	Saint John the Baptist	23,274	44.9
Concordia	137,663	61.2	Saint Landry	141,449	45.2
De Soto	206,445	65.2	Saint Martin	32,646	31.2
East Baton Rouge	100,084	64.7	Saint Mary's	61,890	47.8
East Feliciana	84,765	46.5	Saint Tammany	22,083	91.7
Franklin	43,586	60.4	Tangipahoa	90,769	82.7
Grant	36,409	54.1	Tensas	132,721	56.6
Iberia	25,324	31.3	Terre Bonne	64,913	49.7
Iberville	40,755	23.0	Union	165,616	68.8
Jackson	143,105	75.8	Vermillion	3,758	6.3
Jefferson	12,434	16.1	Washington	71,404	85.9
La Fayette	11,732	10.2	West Baton Rouge	25,369	45.8
La Fourche	60,390	53.2	West Feliciana	62,637	51.8
Livingstone	72,342	63.7	Winn	69,881	74.9
Madison	39,695	45.1			
Morehouse	82,559	64.1	Total	4,003,170	56.9
Natchitoches	187,107	66.2			

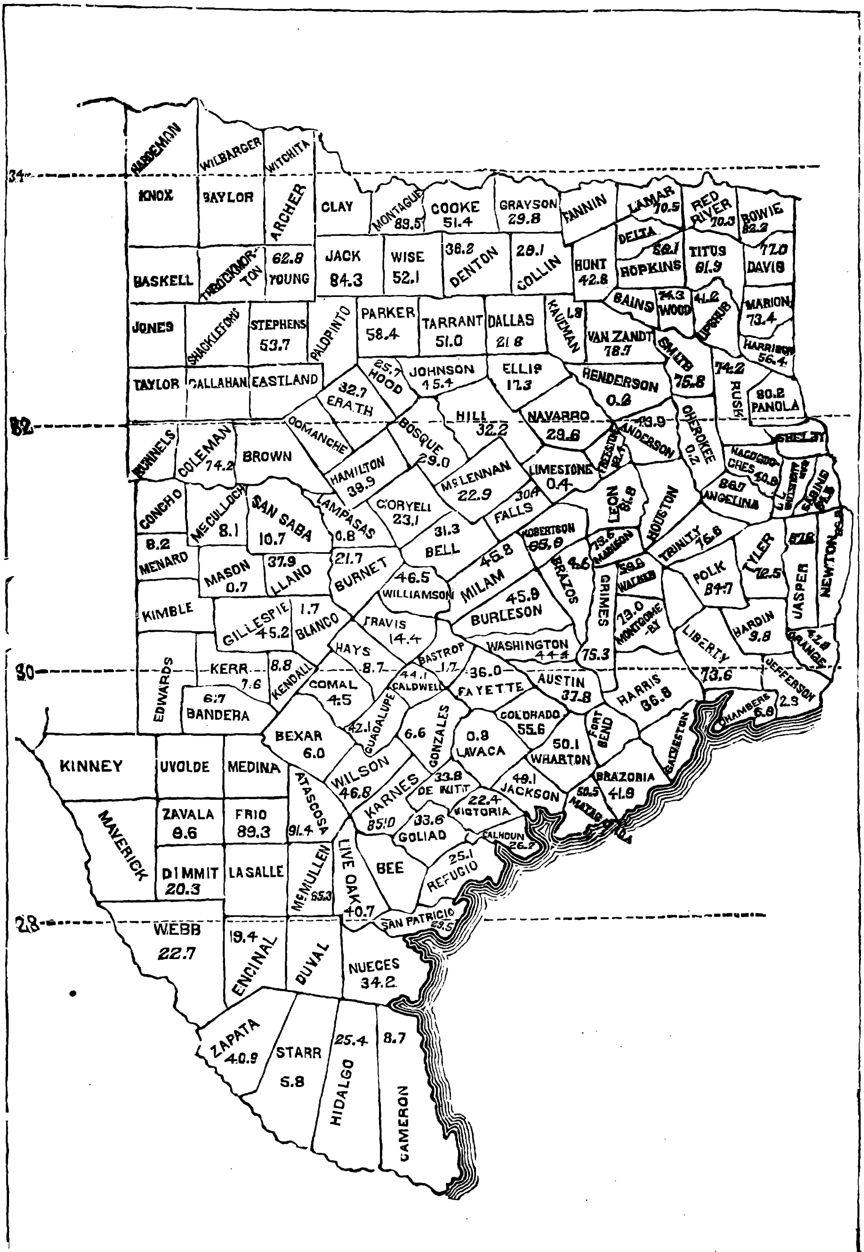
TEXAS.—The honey mesquite (*Algarobia glandulosa*) holds a very prominent place in the forest-growth of Texas. This is a short, spreading tree, shaped like an apple-tree, varying in size from a small shrub to a trunk 18 inches in diameter. It is of the leguminous family, bearing pods which are "about 9 or 10 inches long, and contain about a dozen beans, surrounded by a sweet pulp, as in the honey locust. Both food and pulp are eaten by the Indians, and often by white men; but they are useful chiefly as food for horses." It is reported that fences made of this timber, in Southern Texas, "have been known to stand in a perfect state of preservation more than fifty years." It is allied to *lignum-vitæ*, and resembles it in hardness and durability. It produces a gum resembling, or equivalent to, gum arabic. It is said also to have value for tanning purposes. Next to mesquite, if not before it, in extent, are the oaks, in all varieties. Intermingled with these are the walnut family, ash, elm, and other deciduous trees indigenous to oak-producing soils. The *bois d'arc*, or osage orange, is found in large quantities, and in some sections pine, cedar, and cottonwood. *Jasper* reports its area eighty miles by twenty-five, and "one unbroken forest, except where farms are fenced. There are multiplied thousands of acres of pine forests, as fine, perhaps, as can be found on the continent, but at present of a mere nominal market-value." These forest-lands, yielding all varieties of timber known to the climate, sell at $1 to $5 per acre. *Kaufman* is well timbered. The forests include cedar and a large area of osage orange, which sells at $10 per acre; other timber lands, at $2 to $5. *Hardin* returns 67 per cent. of the area covered with a dense forest of pines, ranging from 1 to 3 feet in diameter and 60 to 100 in height. There are also forests of white oak, magnolia, hickory, and other hard woods. Forest-tracts of any size can be bought for $1 per acre. *Houston* reports 192,000 acres of good pine-forest, worth an average of $1 per acre; 128,000 acres in oaks, $2 per acre; and about 192,000 acres of mixed timber. About one-third the area of *Bandera* is covered with mesquite shrubs, yielding 2 cords of wood per acre; another third, in the mountain valleys, with the usual forest-timbers, worth $2 per acre. *Gillespie* reports about 67 per cent. of the area yet in forest, yield-

ing 30 cords per acre. The oaks are most prominent. *Kerr* reports that "in this mountain region the growth of forest-trees generally is rapidly increasing, owing to the fact that fires, which formerly were of almost annual occurrence, have of late years ceased, in consequence of the increase in stock-cattle, horses, and sheep, which, running at large, keep the grass eaten off short." The whole area of *Tyler*, except the small part cultivated, is heavily timbered with very large trees, including pine and the oaks. No demand for lumber or wood beyond home use. *Nacogdoches* is reported as one of the best timbered counties in Eastern Texas; but forests of pine and other valuable timbers sell at $2 to $5 per acre. About 33 per cent. of *Bandera* is timbered. Live-oaks and the other oaks are most prominent. At the heads of the streams are large brakes of cedar, and, along the banks, cypress. *Austin* reports that, owing to the immense waste of timber caused by the system of fencing, there is already a scarcity, and consequently the price of timber lands is rising. The minimum is $5 per acre, but in some sections it ranges from $25 to $40. Only 20 per cent. of *Williamson* is timbered, the remainder being prairie. In the western section is a large area of mountain cedar, and on the streams large tracts of cottonwood, oak, black walnut, etc. Timbered land sells at about $10 per acre; prairie, at $2 to $10, according to degree of improvement. In *Bexar*, nearly all the timber valuable for building and for rails is used up. Cedar-land is worth $10 to $12 per acre, and rails $4 per hundred in the brake. On prairies which have not been burned over for several years, a thick growth of mesquite is thriving, and promising a supply of posts and rails in a few years. About 67 per cent. of the area of *Burleson* is in forests of hard wood, yielding 75 to 100 cords per acre. Until within a few years, hogs have been reared and fattened on acorns and slaughtered in the woods, "grown to the weight of 200 to 300 pounds, without trouble to their owners beyond ear-marking, and without any feed grown by man's labor." But frosts in March have killed the acorns for several years, making it necessary to raise pork on corn. *Titus* reports 80 per cent. of the area well timbered, and 67 per cent. heavily—mainly with oaks and other hard woods. The average yield is 35 cords, and the value of the forest-land $3 per acre. In *Burnet* the mountain-cedar is the most valuable timber. A cedar-brake, well timbered, sells at $13 per acre; good post-oak forest sells at $5 to $10. *Rusk* is heavily timbered with pine, the oaks, hickory, etc. Many mills are furnishing lumber at the mill at $12.50 per M., and shingles at $3 per M. Forest-lands sell at $5 to $10 per acre. When cleared, the soil produces good corn, cotton, oats, rye, and all kinds of fruit. *Goliad* is well diversified with timber-land and prairie. Among the most valuable kinds are live and other oaks, pecan, elm, and ash. *Henderson* is poorly timbered, except in the swamps and river-bottoms. The pine is about all cut off. *Polk* reports about 67 per cent. of the area covered with forests of the finest timbers known in the South. Pine predominates largely, but oaks of all varieties abound. Timber as yet is of no market-value. Mills are too scarce to supply the home demand. The average yield, at the lowest estimate, is 200 cords per acre. In sections of *Bastrop* cedar is abundant; rails sell at $5 to $6 per hundred. Of the vast forests of pine, all that is suitable for lumber has been sawed up, and forests of young pine are now growing. Pine-lumber sells at $25 to $30 per M. "Millions of acres" of post-oak are reported, yielding 10 to 20 cords per acre. But though one of the best timbered counties in Western Texas, the forests are of little value, owing to lack of transportation. About 25 per cent. of the area of

Kendall is in forests. Lands covered with live-oak, or black-jack, sell at $1.50 per acre; post-oak or cedar, $2 per acre. Post-oak rails, 9 feet long, sell at $4 per 100; cedar, $6. Pecan-forests are reserved for the fruit. *Upshur* reports that pine constitutes one-half its forest-growth, covering an area of 256,000 acres; sells at $2.50 to $5 per acre. Some of it averages 300 cords per acre. Wood, at the railroad, sells for $2.50 per cord, but most of the pine is sawed into lumber and shipped by rail to the prairie country. White oak is the next most valuable variety, and covers an area of about 64,000 acres. Large quantities of pine and oak are found in all parts of *Cherokee*. The pine, sawed into lumber, is shipped by rail to the western counties, and the tops are converted into charcoal, used in smelting iron-ore, with which the county abounds. Several wagon-shops in the county make a market for the oak. Not the least important is the mast which the immense forests of oak, of different varieties, furnish for fattening swine. *Red River*, between Red and Sulphur Rivers, is thirty miles wide. The middle belt, ten miles wide, is prairie, with timber-belts of the same width on each side. The mixed forests include the whole family of oaks, cottonwood, osage-orange, hickory, pine, etc. Seven or eight steam saw-mills are supplying western counties with lumber. The osage-orange, very valuable for carriage manufacture, is of large and rapid growth. The bottoms are very heavily timbered. The average value of forest-lands is $3 per acre. About 75 per cent. of the area of *Harrison* is in wild land, all timbered. The oaks and hickory are found in all parts and pine in most. Dense forests of burr and white oak cover large tracts along the Sabine. Farmers along the Texas and Pacific Railroad are selling standing wood at 75 cents per cord, which contractors sell to the railroad at $2.50. In the southwest section are immense forests of pine, which steam saw-mills are now working up. The lumber sells at $15 to $20 per M. The railroad company has extensive machine-shops at the county-seat, and have their lumber for freight-cars and coach-cars sawed at the adjacent mills. In *Smith*, there is a good supply of hard-wood forests, and pine is abundant in some sections. The price per acre ranges from 50 cents to $5. The principal growths in *Angelina* are long and short leaf pine, all varieties of oak, and sweet and black gum. On the bottoms, among other varieties, black walnut abounds; also, mulberry and magnolia. Forest-land, producing pine in quantity and quality equal to any in the country, is reported at 50 cents to $1.50 per acre, with plenty of water-power at hand, and scarcely any expense for roads for hauling. About 67 per cent. of the area of *Atascosa* is covered with hard-wood forests, among which live and other oaks are most prominent. *Fannin* reports 211,000 acres of forest land, of which 76,800 acres are near Red River, the upland being covered with post-oak, and the bottoms with red oak, black walnut, hickory, and ash. Among the varieties adjacent to the smaller streams is abundant osage-orange, very valuable for both timber and fruit, the boards bringing $50 to $70 per M. The average value of timber-land is $3.25 per acre, yielding probably on an average 20 cords per acre. Timber on the black lands is increasing. Some places that were prairie twenty years ago are now covered with a growth of hackberry, elm, and osage orange 6 to 10 inches in diameter. The only timber of any special value in *Nueces* is the mesquite. It is spreading and growing rapidly. A large territory, open a few years ago, is now a dense forest of mesquite. *Hunt* is a prairie county, largely dependent on eastern counties for building and fencing material. The only valuable timber is the osage orange, skirting the streams. *Bosque* has timber in great abundance and variety.

The burr-oak, red and black cedar, and walnut are the most valuable, followed by the other oaks, black and white ash, pecan, etc. Wood and timber are increasing all over the prairies, wherever the grass has been kept down so as to prevent fires. Our correspondent says: "In 1857 I bought 640 acres of prairie land in this county. Grass was growing all over it as high as my shoulders, with a few scattering live-oaks. To-day all the land not in cultivation is heavily set with trees." *Llano* reports 67 per cent. of the area well timbered with oak, elm, walnut, pecan, and, on the mountains, cedar. About 33 per cent. of *Coryell* is covered with similar woods, cedar excepted. Average value of timbered lands, $5 per acre. The timber is only fit for fence-rails and frames. *Falls* returns about 288,000 acres of timbered land, of which 80,000 are of post-oak, worth $2 to $5 per acre; 12,800 in hickory, $3 to $6; as much more in cedar, worth $10 per acre for the timber alone; and 32,000 acres in mesquite, $1 to $2.50 per acre. Bottom-lands, of superior value, with elm, ash, and cottonwood, $10 to $20 per acre. About 50 per cent. of the lands in *Fayette* are covered with the prevailing kinds of hard woods, and valued at 50 cents to $8 per acre. The average price of wood, $3 per cord. The forest-area in *Grayson* is estimated at 192,000 acres, the best portions yielding not less than 100 cords per acre. Among the more valuable varieties are black walnut and osage orange. Timber, which was on the increase previous to the advent of railroads is now on the decrease. About one-fourth of the lands in *Navarro*, or 160,000 acres, is wooded, at the rate of 25 cords per acre; and the average value $6.50 per acre. Some lands timbered with cedar command $20 per acre. Among the various hard woods in *Victoria* are the honey-locust, osage orange, and six varieties of oak. There is a large per cent. of the pecan, which is a source of considerable revenue. The bottom-land forests yield 40 cords per acre; the upland, 20. The Waxahatchie, or Wadatchie, is spreading rapidly over the prairies, and affords good fuel. The mesquite is also gaining a foot-hold since the fires have been stopped. This wood receives a high degree of polish, and is the best hub-timber known. It does not shrink, and a band put on it in a perfectly green state will remain in the same position for years. About 25 per cent. of the area of *Washington* is in timber, principally the oaks and ash. In sections of the county are quantities of live-oak. The cedar-timber was soon used up by saw-mills, and pine is all imported from Eastern Texas. *Cooke* reports fully one-third of its area, or about 150,000 acres, in forest, principally of the oaks, pecan, elm, and cottonwood. Forests of oak, ash, elm, and hickory cover about 25 per cent. of the lands in *Fort Bend*. "The great storm of September last blew down more than half of the timber of the county, nearly all of which will rot and be a total loss." Half the area of *Lamar* is prairie, and the other half, 288,000 acres, is in forest, heavily wooded; the heavier-timbered land, yielding 100 cords, sells at $5 per acre. In *Bowie*, one-eighth of the forest is pine, with the oaks intermingled; the remainder, on the bottoms of Red and Sulphur Rivers, abounds in ash, hickory, walnut, white oak, etc. *Lavaca* comprises about nine hundred and fifty square miles, rather less than half of which is in forest. The sources of the Lavaca and Navidad, spreading out like the leaves of a fan in the northern part, are thinly fringed with forest, which increases in density as the streams converge into the lower valley, a broad bottom-land covered with forest. Among the most valuable kinds is live-oak. About 50 per cent. of *Colorado* is well wooded; the upland with post-oak, live-oak, hickory, and pecan; all used to good advantage at shops in the county for making wagons,

PLATE XLII.



TEXAS.

carts, and farming implements. The bottoms are covered with heavy forests of live and other oaks, ash, and walnut. The walnut, much used in furniture, is susceptible of a very fine polish, and considered superior to more northern walnut. The nut of the pecan is gathered in great quantities and shipped to northern markets. About 10 per cent. of the area of *Collin*, principally creek and river bottoms, is timber-land. A considerable portion of the growth is osage orange, "believed to be the most durable timber on this continent." Its seed is being shipped in large quantities to many parts of the country, to be planted for hedges. Of the area of *Hays*, 25 per cent. is in forest. Juniper-cedar is the most valuable, bringing $5 per acre. Wood, delivered, is worth $3 per cord. *Lampasas* has been settled twenty years, and there has been an increase rather than a diminution of forest-growth. The mesquite, valuable for tanning purposes, and from which a gum exudes the same as, or similar to, the gum-arabic of commerce, is so pervading and rapid in growth, that denuded tracts will be covered with a dense growth of it in five to ten years. The forests contain all the usual hard woods. About 33 per cent of the land in *Dallas* is in forests, valued at $5 per acre. Among all varieties common to the State, osage orange and cedar are the most valuable.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Anderson	10, 614	43. 9	Grimes	397, 025	75. 3
Angelina	93, 800	86. 7	Guadalupe	67, 734	42. 1
Atascosa	57, 165	91. 4	Hamilton	6, 012	39. 9
Austin	111, 126	37. 8	Hardin	2, 450	9. 8
Bandera	800	6. 7	Harris	55, 871	36. 8
Bastrop	4, 193	1. 7	Harrison	119, 409	56. 4
Bee			Hays	2, 357	8. 7
Bell	56, 682	31. 3	Henderson	507	0. 2
Bexar	7, 129	6. 0	Hidalgo	36, 568	25. 4
Blanco	820	1. 7	Hill	38, 401	32. 2
Bosque	32, 777	29. 0	Hood	14, 536	25. 7
Bowie	104, 392	82. 2	Hopkins	132, 157	56. 1
Brazoria	107, 562	41. 9	Houston		
Brazos	5, 955	4. 6	Hunt	100, 920	42. 8
Brown			Jack	2, 475	84. 3
Burleson	76, 456	45. 9	Jackson	36, 736	49. 1
Burnet	21, 488	21. 7	Jasper	164, 456	87. 2
Caldwell	55, 041	44. 1	Jefferson	575	2. 3
Calhoun	610	26. 2	Johnson	48, 123	45. 4
Cameron	29, 445	8. 7	Karnes	42, 851	85. 0
Chambers	6, 056	6. 9	Kaufman	1, 451	1. 8
Cherokee	376	0. 2	Kendall	5, 435	8. 8
Coleman	1, 300	74. 2	Kerr	3, 383	7. 6
Collin	81, 731	29. 1	Kimball		
Colorado	89, 896	55. 6	Kinney		
Comal	5, 255	4. 5	Lamar	144, 208	70. 5
Comanche			Lampasas	434	0. 8
Cooke	57, 282	51. 4	La Salle		
Coryell	22, 386	23. 1	Lavaca	2, 764	0. 8
Dallas	56, 057	21. 8	Leon	189, 309	81. 8
Davis	182, 001	77. 0	Liberty	85, 868	73. 6
Demmit	180	20. 3	Limestone	1, 299	0. 4
Denton	33, 954	36. 2	Live Oak	23, 024	40. 7
De Witt	67, 733	33. 8	Llano	12, 933	37. 9
Duval			Madison	132, 309	75. 6
Eastland			Marion	85, 017	73. 4
Ellis	29, 859	17. 3	Mason	150	0. 7
El Paso			Matagorda	54, 763	50. 5
Ensinal	850	19. 4	Maverick		
Erath	19, 157	32. 7	McCulloch	305	8. 1
Falls	32, 224	30. 4	McLennan	15, 577	22. 9
Fannin	60		McMullen	2, 210	65. 3
Fayette	126, 455	36. 0	Medina		
Fort Bend	79, 312	52. 6	Menard	700	8. 2
Freestone	24, 167	12. 4	Milam	67, 372	45. 8
Frio	5, 112	89. 3	Montague	25, 817	89. 5
Galveston			Montgomery	191, 722	73. 0
Gillespie	20, 240	45. 2	Nacogdoches	164, 477	40. 9
Goliad	14, 124	38. 6	Navarro	97, 622	29. 6
Gonzales	17, 553	6. 6	Newton	88, 623	89. 3
Grayson	59, 516	29. 8	Nueces	217, 200	34. 2

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Orange	6, 248	47. 8	Trinity	63, 414	76. 6
Panola	256, 125	80. 2	Tyler	139, 670	72. 5
Parker	16, 615	58. 4	Upshur	120, 733	41. 2
Polk	189, 817	84. 7	Uvalde	....	....
Red River	294, 087	70. 3	Van Zant	119, 232	78. 7
Refugio	34, 896	25. 1	Victoria	22, 255	22. 4
Robertson	74, 960	65. 9	Walker	85, 763	59. 9
Rusk	255, 397	74. 2	Washington	141, 185	44. 4
Sabine	121, 734	84. 5	Webb	2, 685	22. 7
San Augustine	6, 167	2. 7	Wharton	40, 997	50. 1
San Patricio	15, 390	29. 5	Williamson	81, 128	46. 5
San Saba	3, 393	10. 7	Wilson	27, 850	46. 8
Shackelford	....	....	Wise	13, 211	52. 1
Shelby	....	....	Wood	121, 698	74. 3
Smith	239, 442	75. 8	Young	590	62. 8
Starr	500	5. 8	Zapata	142, 362	40. 9
Stephen	1, 170	53. 7	Zavala	150	9. 6
Tarrant	86, 435	51. 0			
Titus	217, 123	61. 9	Total	7, 662, 294	41. 6
Travis	27, 846	14. 4			

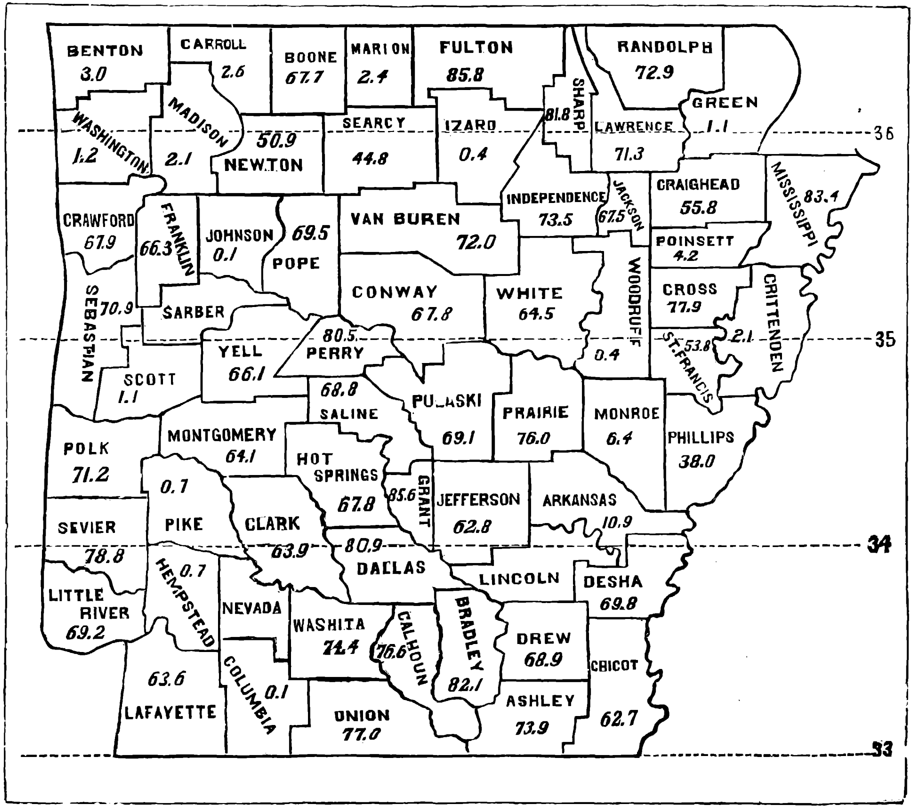
ARKANSAS.—The forest-lands in this State differ from those of Texas chiefly in yielding no mesquite, less of osage orange, and more of pine and gum. *Dallas* has scarcely an uncleared acre not covered with valuable timber of pine, oak, and hickory. In *Dorsey*, 75 per cent. of the area is "covered with as fine timber as the world produces." The pine-forests average 15 to 20 M of fine-lumber per acre, "besides an immense amount of wood." The swamps along the Saline River are covered with a magnificent growth of hickory, cypress, gum, and walnut, which can be rafted to New Orleans. It is anticipated that the timber in the county will be worth millions when railroads in progress are completed. The forests in *Craighead* include all common varieties, and it is estimated that they cannot be exhausted within this generation or the next. The soil is reported good, and the forest-land cheap. In *Fulton*, as farms are being opened, fires on the prairies diminish, and the destruction of woods from that cause becomes less and less annually. Lands naked of timber a few years ago are now covered with a fine growth of hickory and oak, and notwithstanding there has been much timber cut for farm purposes, there is now much more in the county than ten years ago. *Crawford* was originally all timbered. Among the usual varieties the oaks predominate; yellow locust, mulberry, and osage orange grow in less quantities. Oak-lumber, delivered, sells at $18 per M. *Saint Francis* reports 67 per cent. of the land covered with fine timber of oak, poplar, ash, cypress, and hickory. Along the Saint Francis River are large quantities of cotton-wood. In *Ashley*, the pine-forests will yield 20 to 25 M of lumber, and the forests of hard wood 50 to 200 cords of wood, per acre. The value is nominal owing to lack of transportation. *Marion* is well timbered with pine-forests, interspersed with the oaks. *Sevier* claims the finest pine-forests in the State, and on the river-bottoms large forests of the very best timber of oaks, walnut, cherry, and cypress. *Lawrence* reports the uncultivated portion one solid forest, including the prevailing hard-wood timbers and cypress, all of the finest quality. There is no export traffic, and considerable quantities of lumber are destroyed annually in clearing land for cultivation. *Cross* abounds in timber, varying in kinds and qualities, much of which is destroyed in clearing land. Of the area in *Monroe*, 80 per cent., being over 300,000 acres, is in mixed forests. The white-oak, hickory, and pine timber would be exceedingly valuable with market facilities. Cypress abounds, and more or less is shipped to New Orleans. Lumber, at the mills, commands $20 per M. Less than 5 per cent. of *Montgomery* is in cultivation, and all the remainder is heavily timbered. The larger part still belongs

to the United States. The oaks predominate, with pine, walnut, hickory, etc. *Yell* is heavily timbered; on the bottoms with oak, sweet-gum, and cotton-wood; on the ridges and mountain-lands, with yellow and pitch pine, large and tall. Large quantities of pine, ash, and walnut are floated down the Arkansas to Little Rock, and some to New Orleans. The yield on the bottoms varies from 150 to 220 cords per acre. The quantities of white oak, hickory, and ash, of the finest quality for carriage and other manufactures, are alleged to be inexhaustible. The report states, "If there is anything in which this part of the United States excels all other parts, it is the variety, quantity, and quality of its timber." Many oak and cotton-wood trees are found 5 and 6 feet in diameter. *Boone* reports 75 per cent. of its land in forest, and one-third of this yellow pine of the best quality, belonging to the Government. Pine-lumber, at the mill, is worth $12.50 per M. The remaining forest is principally of black-jack and hickory, and yields 15 to 20 cords per acre. In *Independence*, pine is scarce and inferior, and the lumber worth $25 per M. Wood, on the river-banks, is worth $2.50 per cord; but timber, other than pine, is not held in any value, and in buying and selling land by the acre often only the cultivated is counted, the timber-land—sometimes constituting half the acres—being "thrown in." In *Benton*, "the forest-area has grown very rapidly during the last 25 years." Lands naked at the beginning of that period, are now heavily timbered. There is a considerable area of yellow and pitch pine, and large quantities of the toughest and most durable white oak. Pine-lumber sells for $15 per M. Excepting a few small prairie tracts, *Washington* is made up of timber-lands; on the uplands, oak and hickory; on the bottoms, among other varieties, black walnut and cherry. The only market is for home consumption; wood sells at $1.50 per cord; rails, at $2 per hundred. In *Bradley*, yellow pine is "simply inexhaustible;" hickory and the oaks very abundant—all timber of the finest quality. *Franklin* reports about 250,000 acres in forest; on the uplands, chiefly of oaks, hickory, elm, and black walnut, averaging 35 to 40 cords per acre; on the bottoms, a mixture of deciduous kinds, including honey-locust, yielding 75 to 100 cords per acre. Vast quantities of timber, valuable for agricultural implements, wagons, and other manufactures, are annually destroyed. The county contains timber, wood, coal, and stone in close proximity. In *Miller*, yellow and pitch pine prevail on the hills; on the bottoms, almost every variety of hard wood, with cypress, cedar, and cotton-wood. The osage orange furnishes timber for carriage-wheels which is "practically indestructible, neither shrinking in the hot sun nor swelling when wet. The holly is used largely for the teeth of cog-wheels and inlaying in cabinet-work." It is estimated that the whole area of the county, seven hundred square miles, will average 10 pine-trees per acre, yielding 500 feet of lumber—224,000 M. All uncleared land in *Ouachita* is heavily timbered, the uplands principally with yellow pine, interspersed with the oaks, hickory, and walnut; the bottoms, with white oak, other hard woods, and cypress. The pines, white oak, ash, and cypress are considered "the best timber in the world, and in inexhaustible quantities." Considerable quantities of pine and cypress are floated to New Orleans. All along the Ouachita and its tributaries large quantities of staves are manufactured and shipped to France and Spain annually. Many of the white-oak trees are 5½ feet in diameter. *Baxter* has about 64,000 acres in the best of pitch-pine, averaging 10 M of lumber per acre, worth $10 per M at the mill. About 128,000 acres are timbered with oak, suitable for wagon-timber and staves, and 64,000 acres with oak, hickory, and other kinds. *Scott* reports that, except the land under cultivation, the area is one vast forest, including the best timbers found in the West.

Among these are yellow pine, seven kinds of oak, hickory, ash, and black walnut. The pine and oaks attain a height varying from 60 to 150 feet, and a diameter the former of 5 feet and the latter of 7. *Jackson* is heavily timbered. The leading kinds are gum, cypress, oak, and hickory. The trade in white-oak staves for the European market is important. There are about 3,000 acres of white oak, on which the standing timber is worth $20 per acre; 1,000 of walnut, worth $25 per acre. Considerable walnut timber is floated to New Orleans. In *Izard*, the oaks predominate, and after them yellow pine, and in the mountains cedar. Very little market. *Perry* is densely timbered with oak, pine, cypress, and other varieties. The quantity is so immense as to make it of little value. Pine and cypress are shipped to Little Rock and there sold at $7 to $10 per M. *Howard* is very heavily timbered. It has immense quantities of pine and oaks, with less of black walnut, osage orange, and other valuable varieties. The yield per acre is placed at from 100 to 200 cords. Pine-lumber sells at $12.50 per M; oak, $20; black walnut, cherry, and osage orange, $40. The last named is used for pillars in buildings, as well as for carriages. *Sharp* reports 400,000 acres in timber, of which about 15,000 are in yellow pine, and the remainder a mixture of hard woods. *Sebastian* reports 75 per cent. of the land in forests, "as heavily timbered as any west of the Mississippi." Average per acre, 50 cords. The mountains are mostly covered with yellow pine. The average value of timbered land is $3 per acre, though in some localities much cheaper. *Pulaski* reports timber so abundant that millions of cords are annually destroyed in clearing land. Value, 50 cents to $1 per acre. *Van Buren* returns 80 per cent. of the land in forests, in which white and red oak, hickory, and pine abound. The average price of forest-lands is $2 per acre, and the yield equal to any in the State. From the extensive pine-forests which line the Little Red River large quantities are being cut and rafted to New Orleans and other cities. Of the forests in *Garland*, 65 per cent. are pine, 30 per cent. hard wood, and 5 per cent. cedar. From a tract having a saw-mill on it, and on which the timber and wood were worked up and marketed, the net profits footed up at $550 per acre.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Arkansas	12, 246	10. 9	Madison	2, 315	2. 1
Ashley	177, 611	73. 9	Marion	1, 462	2. 4
Benton	5, 841	3. 0	Mississippi	63, 932	83. 4
Boone	72, 885	67. 7	Monroe	5, 754	6. 4
Bradley	195, 128	82. 1	Montgomery	20, 172	64. 1
Calhoun	67, 542	76. 6	Newton	14, 814	50. 9
Carroll	1, 408	2. 6	Ouachita	209, 523	74. 4
Chicot	83, 882	62. 7	Perry	36, 386	80. 5
Clarke	110, 755	63. 9	Phillips	33, 393	38. 0
Columbia	429	0. 1	Pike	498	0. 7
Conway	136, 291	67. 8	Poinsett	976	4. 2
Craighead	43, 097	55. 8	Polk	14, 037	71. 2
Crawford	51, 602	67. 9	Pope	61, 843	69. 5
Crittenden	2, 180	2. 1	Prairie	72, 617	76. 0
Cross	55, 210	77. 9	Pulaski	150, 472	69. 1
Dallas	131, 292	80. 9	Randolph	90, 749	72. 9
Desha	92, 633	69. 8	Sabine	43, 568	68. 8
Drew	163, 941	68. 9	Scott	1, 168	1. 1
Franklin	76, 129	66. 3	Searcy	22, 217	44. 8
Fulton	88, 232	85. 8	Sebastian	118, 562	70. 9
Grant	77, 670	85. 6	Sevier	74, 394	78. 8
Greene	1, 073	1. 1	Sharp	103, 321	81. 8
Hempstead	1, 318	0. 7	Saint Francis	26, 189	53. 8
Hot Springs	41, 365	67. 8	Union	236, 581	77. 0
Independence	184, 447	73. 5	Van Buren	42, 661	72. 0
Izard	787	0. 4	Washington	3, 409	1. 2
Jackson	60, 422	67. 5	White	135, 753	64. 5
Jefferson	125, 478	62. 8	Woodruff	487	0. 4
Johnson	209	0. 1	Yell	66, 331	66. 1
La Fayette	149, 848	63. 6			
Lawrence	21, 261	71. 3	Total	3, 910, 325	51. 4
Little River	24, 429	69. 2			

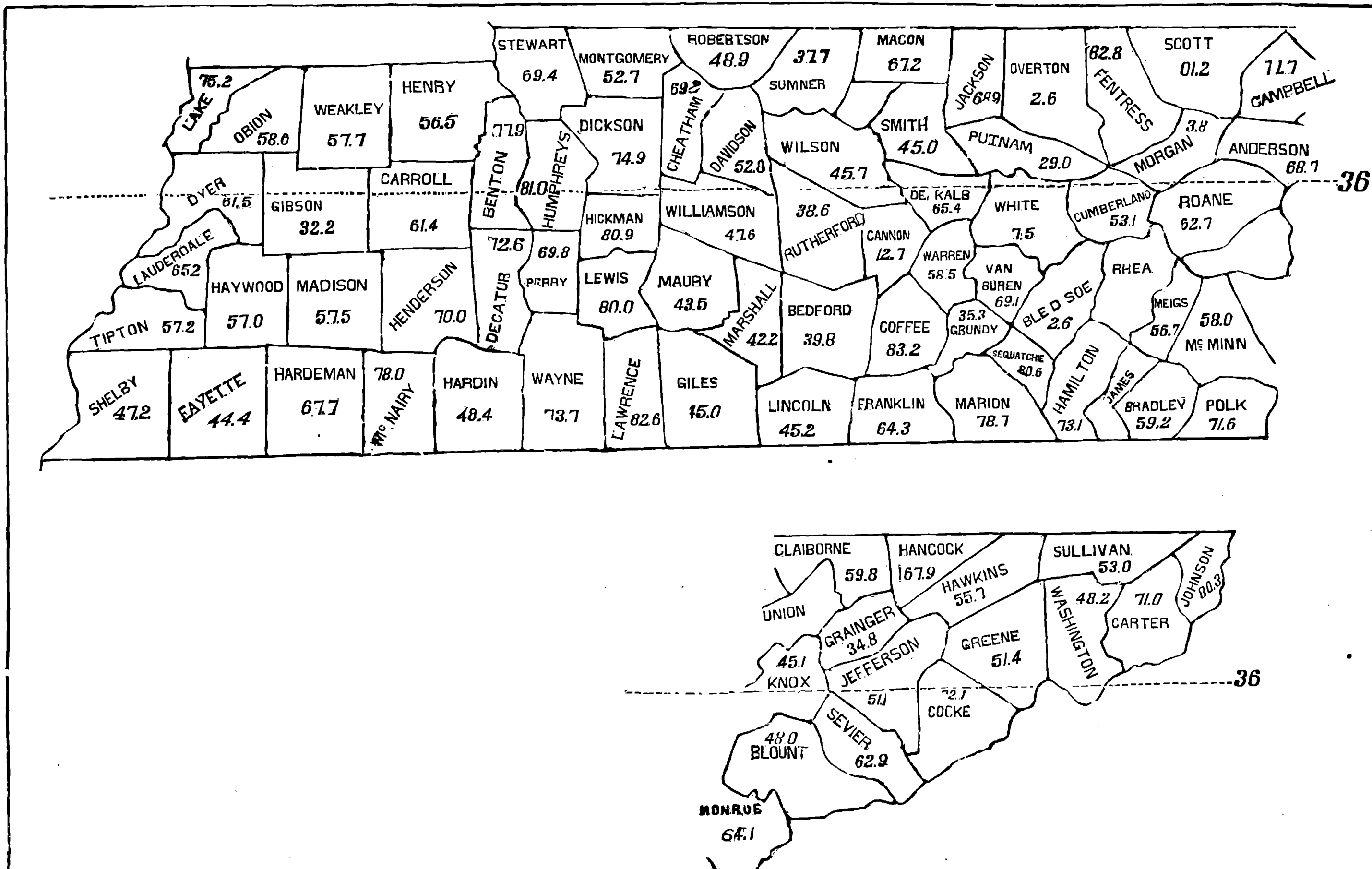
PLATE XLIII.



ARKANSAS.

TENNESSEE.—The mixed forests in *Fentress* average 100 cords per acre. The mountains are covered with red cedar. Among the deciduous kinds, chestnut, black walnut, and yellow poplar are found; trees of the latter 7 feet in diameter. The forests of *Decatur* are principally of hard woods and poplar, held at $2 to $10 per acre; the best yielding 40 cords per acre. In *Rhea*, the average yield is 40 cords per acre, and the value of wood, delivered on the banks of the Tennessee, $1.50 per cord. The trees are mostly hard wood, the oaks being more prevalent. *Putnam* reports about 40,000 acres in the central part, timbered with the oaks, hickory, and chestnut, yielding 60 cords per acre; and equal areas in the eastern and western parts, from which might be cut 50,000 M of yellow poplar lumber, 4,000 M of black walnut, and 4,000 M of buckeye, and, in addition, 40 cords per acre of other timber and wood. The present value is merely nominal. In *Gibson*, 80 per cent. of the area is densely timbered. The most prevalent kinds are the oaks, poplar, cypress, gums, hickory, and black and white walnut, only utilized for buildings and the manufacture of carriages, plows, and barrels. *Houston* is well timbered with the same kinds, also with chestnut. The average yield in solid lumber is 15 M per acre, worth $15 per M; in wood, 35 cords per acre. *Cameron* reports 75 per cent. of its land in broken forest, and estimates the yield of the best at the extravagant rate of 700 cords per acre. Cedar, yellow poplar, (5 to 7 feet in diameter,) cherry, and black and white walnut are the most valuable kinds. *Bledsoe* has heavily-timbered forests, but no means of transporting lumber. *Sumner* places the area in forest at 160,000 acres, half of which is heavily timbered with the most valuable kinds, prominent among which are the oaks, chestnut, hickory, and poplar. Recently large quantities of walnut logs have been shipped to Cincinnati. *Shelby* abounds in timber which "is being slain very rashly—in fact, wantonly." *Henry* has no timber of sufficient value to export, and imports much from adjoining counties, though about half the area is in forest. *Sullivan* abounds in all kinds of timber common to the region. Black-walnut trees are found 4½ feet in diameter, yielding 2½ M of lumber, worth $40 per M. Chestnut trees, 7 to 8 feet in diameter; also poplar and white oak very large and tall, and of the finest quality of timber. The yield of the heaviest forests is estimated at 300 cords per acre. From one-third to one-half of *Warren* is in forests of the different hard-wood trees, with poplar and cedar. Utilized in the county by only one hub and spoke factory, using hickory chiefly. About 67 per cent. of the land in *Jefferson* is covered with mixed forests. Yellow poplar, the oaks, hickory, rock-maple, and black walnut are prominent. *Bedford* has about 80,000 acres in forest, nearly 10,000 of which are in cedar, worth $25 to $200 per acre. Among the other kind are walnut and cherry for furniture, hickory, oak, a vast amount of poplar, and fine groves of red and black locust. The value per acre varies from $5 to $100. Large quantities of valuable timber are burned on the ground in clearing land. Cedar-lumber is worth $25 to $30 per M; other kinds, $12.50 to $15. *Perry* reports 95,874 acres in woodland. Among the kinds, black walnut is named first. The value along the Tennessee River is $50 per acre, while for the county it is not above $15. Timber-trees range from 2 to 7 feet in diameter. *Van Buren* reports that its forests for lumber cannot be excelled by any county in the State, and for wood are inexhaustible. The most valuable kinds are yellow poplar, oaks, walnut, cherry, chestnut, and hickory. About 87 per cent. of the land in *Lawrence* is covered with forests, principally of white oak, hickory, poplar, chestnut, and black walnut; "inexhaustible, and the quality unexcelled." Timbered land is worth $10 per acre;

wood delivered, $2 per cord. *Tipton* reports an abundance of hard wood, poplar, and cotton-wood timber, and, on the lowlands, cypress. Many oak staves and some lumber are shipped, and some timber rafted. In *Blount* 40 to 50 per cent. of the land is in mixed deciduous forests of excellent timber, yielding 75 to 100 cords per acre. In *Rutherford*, cedar, black walnut, and poplar are the most valuable; timber-lands well set in cedar are in demand at $40 to $50 per acre. The traffic in cedar is extensive, and yields a large income to the county. Some black walnut is shipped. *Hancock* returns half its area, or 204,800 acres, in heavily-timbered forests, in which black and white walnut and poplar in great abundance and yellow pine of enormous size are found. *McMinn* reports "a vast amount of timber" of all varieties, some forests yielding as high as 100 cords per acre. *De Kalb* returns half or more of the area in forests; about half table-land, covered with a moderate growth of oak and hickory, and half lowlands, covered with a very veavy growth, in which poplars ranging from 4 to 6½ feet in diameter and 40 to 60 feet below the limbs are abundant. In a suit at law respecting a tract of these forests, the amount of wood, apart from the heavy timber-trees which constitute from one-third to one-half of the yield, "was estimated by several intelligent witnesses under oath at 500 cords per acre." *Meigs* also reports one-half the area in forests. White oak is most abundant; one-third of the forests will average 10 pine-trees per acre. The yield varies from 20 to 50 cords, and the average market-value is $5 per acre. But little demand for timber. In *Anderson*, over half the land is well timbered with oaks, hickory, poplar, and pine, yielding 250 cords per acre, and the average salable value $20 per acre. Coal and iron are abundant in the county. *Bradley* has thousands of acres in timber-forests never yet touched with an ax. Heavily-timbered land can be bought for $5 per acre. In *Campbell*, 80 per cent. of the land, or 220,000 acres, is in forests, which include all varieties of timber known to the State. *Loudon* reports 70 per cent. of the area in forest, 40 per cent. of which is oak. The heaviest forests yield over 50 cords per acre, but the average is 20; "50 cents per cord when cut and 50 cents per cord for cutting." Fully half the land in *Maury* is still in native forests. Yellow poplar, and black walnut 6 feet in diameter are not uncommon; 35 M of poplar lumber have been taken from a single acre. Valuable forests of cedar abound in the eastern part. In the home-market, cedar-rails sell at $40 to $50 per thousand. A large amount of poplar and walnut lumber is shipped to northern cities. The average yield is estimated at 100 cords per acre. *Roane* estimates 67 per cent. of the land in forests, yielding timber of all varieties. Wood, delivered at the railroad or river, is worth $1.50 to $2 per cord; lumber, $12 to $15 per M. In the hilly parts of *Lincoln*, a large area of heavily-timbered land remains undisturbed, much of it yielding 200 to 300 cords per acre. The principal kinds are poplar, black and white walnut, cherry, locust, and oaks. A number of saw-mills are cutting the timber into lumber, which finds a ready sale at $15 per M. Wood, in market, sells at $1.50 to $2.50 per cord. In *Monroe*, 33 per cent. of the land is in original forests, in nearly half of which the timber is dense and heavy; oaks, hickory, chestnut, poplar, and pine. In *Dickson*, black walnut, cherry, and ash are becoming scarce, but oak and poplar are still abundant. The forests vary in yield from 30 to 70 cords per acre. Standing wood is worth 25 cents per cord. *Sevier* reports vast quantities of timber, including varieties of pine, oak, poplar, walnut, and locust. *Johnson* returns 128,000 acres in timber. Chestnut and ash, formerly little used except for fences, are now coming into general use for building-purposes. The bark of



STEWART
69.4
MONTGOMERY
52.7
ROBERTSON
48.9
SUMNER
MACON
67.2
JACKSON
OVERTON
2.6
82.8
FENTRESS
SCOTT
01.2
CAMPBELL
LAKE
OBION
58.6
WEAKLEY
57.7
HENRY
56.5
DICKSON
74.9
CHEATHAM
DAVIDSON
52.8
WILSON
45.7
SMITH
45.0
PUTNAM
29.0
3.8
MORGAN
ANDERSON
DYER
GIBSON
32.2
CARROLL
61.4
BENTON
HUMPHREYS
HICKMAN
80.9
WILLIAMSON
38.6
RUTHERFORD
DE, KALB
65.4
WHITE
7.5
CUMBERLAND
53.1
ROANE
62.7
36
LAUDERDALE
HAYWOOD
57.0
MADISON
HENDERSON
70.0
DECATUR
72.6
69.8
PERRY
LEWIS
80.0
MAURY
43.5
MARSHALL
42.2
BEDFORD
39.8
CANNON
12.7
WARREN
58.5
VAN BUREN
COFFEE
83.2
GRUNDY
BLEDSOE
2.6
RHEA
MEIGS
58.0
MC MINN
TIPTON
57.2
SHELBY
47.2
FAYETTE
44.4
HARDEMAN
78.0
MC NAIRY
HARDIN
48.4
WAYNE
73.7
LAWRENCE
82.6
GILES
15.0
LINCOLN
45.2
FRANKLIN
64.3
SEQUATCHIE
80.6
MARION
78.7
HAMILTON
73.1
JAMES
BRADLEY
59.2
POLK
71.6
CLAIBORNE
59.8
HANCOCK
67.9
HAWKINS
55.7
SULLIVAN
53.0
JOHNSON
80.3
WASHINGTON
48.2
71.0
CARTER
UNION
GRAINGER
34.8
45.1
KNOX
JEFFERSON
GREENE
51.4
36
COCKE
SEVIER
62.9
BLOUNT
MONROE

PLATE XLIV.

chestnut-oak and hemlock is sold extensively for tanning. *Weakley* is well timbered with all the common varieties. Wood, near the railroad, in the tree, brings 50 to 75 cents per cord. The forests in *Cheatham* include all the usual varieties of timber, and are estimated to yield 50 cords per acre and leave timber enough standing for all farm purposes. The chestnut-oak is specially valued for its bark. In *Smith* are about 75,000 acres in forest, much of it dense, with heavy beech, poplar, oak, ash, sugar-maple, black walnut, and hickory, valued at $10 to $50 per acre. Recently, for a lot of 50 acres, $40 was offered for the timber alone. *Giles* reports a great abundance of the most valuable timber, including yellow poplar, black walnut, locust, and cedar. Poplars are found in abundance, 5 to 6 feet in diameter, and 60 feet below the first limb. Poplar lumber, which usually sells at the mills at $20 to $22 per M, brings now only $15. In *Montgomery*, lands that were prairie when the county was settled are now covered with timber. It is so abundant, that, although large quantities are cut for furnaces, it is comparatively worthless. Our correspondent—owning a farm within three miles of Clarksville, and lying on the Cumberland River, on the banks of which wood can be delivered to steamboats, and down which timber-logs can be rafted—in clearing land for cultivation, does not easily find contractors who will remove the timber and wood for it. One-third of the land in *Trousdale* is in forest; oak, poplar, ash, and black walnut are the most valuable kinds. In *Williamson*, cedar-forests are the most valuable, selling at $60 to $300 per acre, and the timber at $30 to $50 per M. Half the timber in the county is sugar-maple, used largely in manufacturing chairs and ornamental wood-work. Oak and poplar lumber sell at $15 per M. Thousands of acres of poplar and oak timber yield each 30 to 60 M. Bucket-factories are using large quantities of cedar. The yield of wood varies from 20 to 60 cords per acre, and the price of standing wood is from 25 cents to $1.50 per cord. About 40 per cent of the land in *Davidson* is in forest, yielding 50 cords per acre; valued, standing, at $1 per cord; at Nashville, $4; lumber, $15 to $20 per M. A large portion of *Coffee* is what is known as "barrens," and is timbered with oaks, averaging 25 cords per acre. The forests on the hills, chiefly poplar and chestnut, average 50 cords per acre. The best poplars are 6 to 8 feet in diameter, and black walnut is found 5 feet in diameter, with 60 feet clear of limb. Large amounts of lumber are shipped. The best timbered lands on the hills sell at $20 to $30 per acre. In *McNary*, wood, along the railroad, sells at $2.25 per acre. Though there are in the county excellent pine-forests, and extensive bottoms heavily timbered with poplar, sweet gum, white oak, &c., yet, for the want of mills, a great deal of lumber used in building is imported. *Obion* reports about 95,000 acres in forest, averaging in value $10 per acre. These forests are of a very heavy growth, and include nearly every kind of timber.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Anderson	111,967	68.7	Cocke	181,448	72.7
Bedford	106,468	39.8	Coffee	330,733	83.2
Benton	165,678	77.9	Cumberland	99,112	53.1
Bledsoe	4,562	2.6	Davidson	147,046	52.8
Blount	104,886	48.0	Decatur	131,538	72.6
Bradley	112,116	59.2	De Kalb	97,588	65.4
Campbell	139,668	77.7	Dickson	154,511	74.9
Cannon	19,210	12.7	Dyer	149,107	61.5
Carroll	203,502	61.4	Fayette	140,900	44.4
Carter	103,625	71.0	Fentress	140,144	82.8
Cheatham	100,551	69.2	Franklin	176,603	64.3
Claiborne	113,137	69.8	Gibson	105,397	32.2

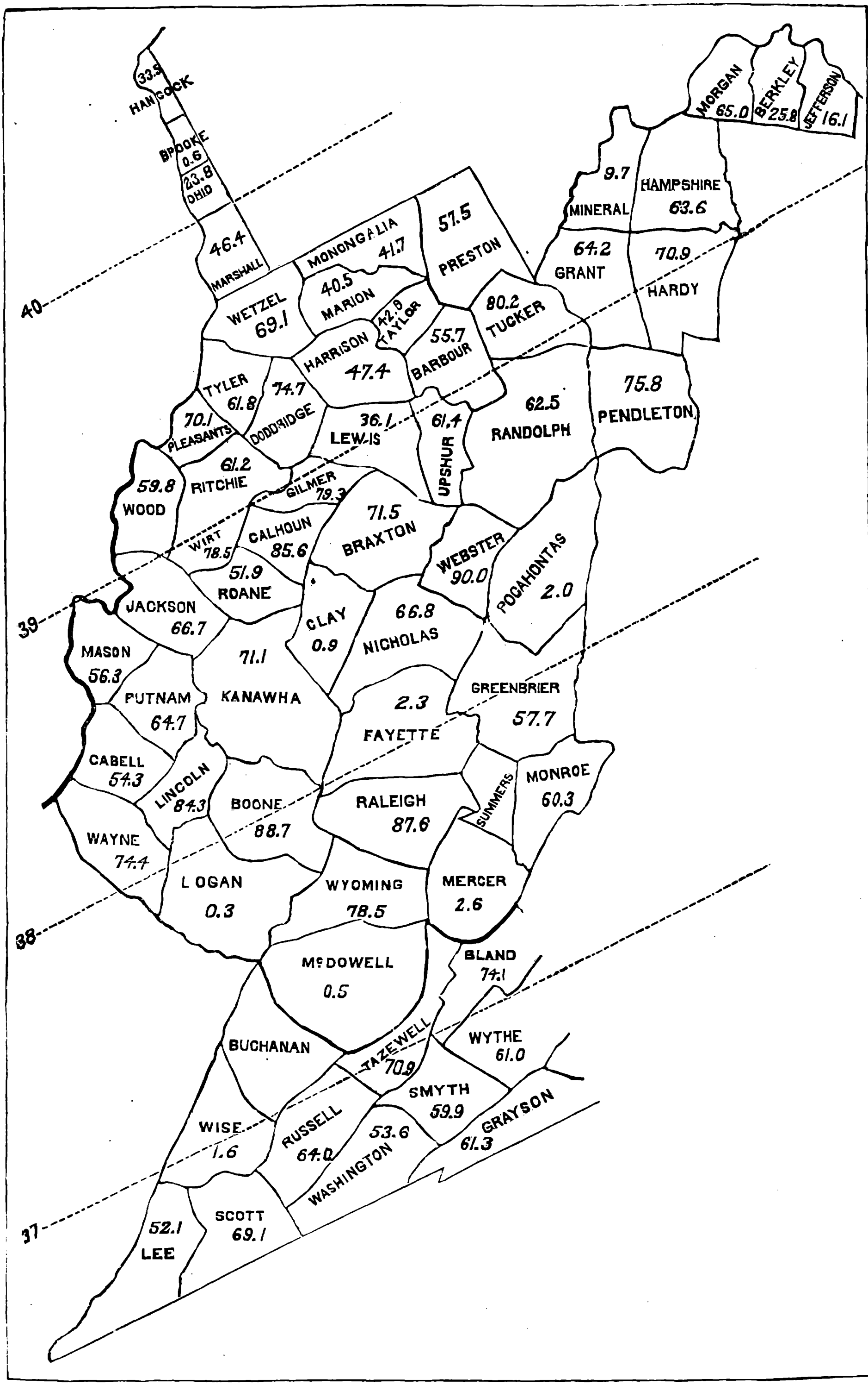
Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Giles	150,406	45.0	Montgomery	156,363	52.7
Grainger	66,395	34.8	Morgan	5,289	3.8
Greene	171,978	51.4	Obion	107,049	58.6
Grundy	25,206	35.3	Overton	7,074	2.6
Hamilton	192,512	73.1	Perry	95,874	69.8
Hancock	84,463	67.9	Polk	87,553	71.6
Hardeman	335,859	67.7	Putnam	54,385	29.0
Hardin	103,363	48.4	Rhea	57	....
Hawkins	146,979	55.7	Roane	177,559	62.7
Haywood	135,084	57.0	Robertson	139,456	48.9
Henderson	231,446	70.0	Rutherford	132,710	38.6
Henry	148,433	56.5	Scott	3,048	1.2
Hickman	256,450	80.9	Sequatchie	65,920	80.6
Humphreys	206,850	81.0	Sevier	126,720	62.9
Jackson	155,338	68.9	Shelby	168,272	47.2
Jefferson	123,622	51.1	Smith	113,773	45.0
Johnson	128,635	80.3	Stewart	127,590	69.4
Knox	177,413	45.1	Sullivan	119,443	53.0
Lake	41,819	75.2	Sumner	128,902	37.7
Lauderdale	103,289	65.2	Tipton	92,907	57.2
Lawrence	158,743	82.6	Union	100	....
Lewis	55,632	80.0	Van Buren	69,978	69.1
Lincoln	162,621	45.2	Warren	122,388	58.5
Macon	92,369	67.2	Washington	111,709	48.2
Madison	139,490	57.5	Wayne	244,545	73.7
Marion	157,104	78.7	Weakley	214,346	57.7
Marshall	84,052	42.2	White	11,472	7.5
Maury	161,258	43.5	Williamson	150,130	47.6
McMinn	136,720	58.0	Wilson	151,749	45.7
McNary	238,814	78.0			
Meigs	54,173	56.7	Total	10,771,396	55.0
Monroe	219,017	64.1			

WEST VIRGINIA.—It is estimated that 83 per cent. of the land in *Fayette* is in forests, averaging 100 cords per acre. The principal trees are oaks, chestnut, sugar-maple, (utilized in making sugar,) and poplar, with some black walnut and cherry. Forest-land, along the railroad, sells at $10 per acre; back ten miles, at $1. In *Jefferson*, the forests are estimated to average a net value of $60 per acre. In *Randolph*, poplar, oak, and cherry trees are 7 feet in diameter; chestnut and black walnut, 4 and 5 feet. Only about 5 per cent. of the county is cleared, the remainder being "an unbroken forest very heavily timbered." In *Boone*, forest-trees attain an enormous size. The reputed maximum diameter is, for yellow and white poplar and sycamore, 15 feet; black walnut, 10; chestnut and elm, 8; bass-wood, pitch-pine, hemlock, and ash, 6; butternut, wild-cherry, beech, maple, and buckeye, 4; black locust, 3½; dog-wood, 1. The average size is placed at half these diameters. "The value is prospective, awaiting means of transportation." About 33 per cent. of *Mercer* is heavily timbered with large and tall trees. The oaks are most abundant, followed by hickory, poplar, and chestnut, with some walnut, cherry, &c. The territory of *Logan*, including one thousand five hundred and twenty-six square miles, is very mountainous, and covered with heavy forests of mixed timber. The maximum diameter of poplars is 6 feet; chestnut and beech, 7; oaks and walnut, 4. In the forests of *Tyler*, the oaks are most abundant; poplar comes next; then black and white walnut, and wild-cherry. Some tracts of white oak yield 15 to 20 M per acre. The most valuable timber in *Marion* is of white oak, very abundant, poplar, and black walnut. Most of the poplar and walnut have been cut off. Large quantities of the white oak have been rafted down the Monongahela to Pittsburgh for steamboat building, and other large quantities sent to Baltimore market by rail, in the form of staves, or shooks, and ship-timber. About thirty years ago our correspondent found on a side hill, too steep to plow, a

half-acre grown up to locust-bushes, which he thinned out so as to leave, as they grew up, good pasture underneath and shade above. He has recently refused $200 for the locust-trees standing on the half-acre, which are still "growing more valuable every year." In *Doddridge*, recently the white oak and poplar timber on a tract of 10,000 acres was sold, standing, for $4.50 per acre. After its removal, enough timber was left for fencing purposes, and a great amount of wood. The tract was about six miles from the railroad. The estimated value of forest-timber for the whole county is $4 per acre. The average yield per acre returned for the forests in *Preston* is 6 M of oak, 3 M of poplar, and 1½ M of other kinds of timber, with 150 cords of wood. Oak-lumber is worth $15 per M; poplar, $20. Sixty per cent. of the land is in forest, estimated at $4 per acre. The timber left in *Harrison* is chiefly oak, with some poplar and locust. The estimate is 64,000 acres in forest, worth $15.62 per acre, and an equal amount of culled timber and young growth, worth $7.81 per acre. *Crabtree* abounds in oak, poplar, and walnut timber of a very fine quality. Timbered land sells for $4 to $10 per acre. Large quantities are sent to market in logs and staves. Eighty per cent. of the area in *Grant* is in mixed forests, embracing all the common kinds of timber. No lumber is manufactured for export. The estimated yield per acre of forests in *Raleigh* is very high, being 43 M in pine-lumber. Nearly half of *Monroe* is yet in forests, including some tracts of yellow pine of fine quality, others of white oak, and others of mixed timber, of little value owing to the want of a market. *Lincoln* reports at least 211,000 acres in forests, in which are thousands of acres never yet touched by an ax. About 25 per cent. of the land in *Wood* is in forest, but nearly all much culled. The average value per acre is $15. Of *Ritchie* 76 per cent., or about 320,000 acres, is in an unbroken forest, including all the prevailing kinds of hard-wood timber, with yellow and white pine. There are oaks 5 to 7 feet in diameter, and the timber generally is of large size. About 75 per cent. of the land in *Gilmer* is covered with forests, in which white oak is most abundant. White oak and poplar lumber is worth at the mills $10 to $12.50 per M. The yield ranges from 40 to 50 cords per acre. Trees are often more than 100 feet in height. *Braxton* has about 350,000 acres in original forests of mixed varieties, among which oak and poplar are the most valuable. The whole averages 160 cords per acre, and one-half at least 200; a tract of 30 acres, rather below the average, recently cut for the iron-furnace, yielded 6,000 cords. From this land many of the white-oak and poplar trees had been previously cut for lumber. Standing wood is worth 75 cents per cord. It is estimated that much of this forest-land would yield per acre 20 M of lumber and 160 cords in addition. From one-fourth to one-fifth of the land in *Berkeley* is in growing timber, chiefly white and black oak in the valleys and pine and poplar on the high lands, the best yielding 120 cords per acre, but the average 50. *Tucker* has large amounts of valuable timber, among which are the oaks, poplar, pine, black walnut, and cherry. Timbered lands sell at $3 to $5 per acre. A large tract, valued at that rate, is covered with a heavy growth of cherry of very fine quality. White and red oak is manufactured into staves, which sell at $16 to $18 per thousand. These are manufactured into shooks and shipped East. *Wetzel* is reported as "splendidly timbered" with the oaks, poplar, white and black walnut, chestnut, locust, etc. Oak-bark, for tanning, is in good demand, and some have paid for their farms by it. From 75 to 80 per cent. of *Nicholas* is in forests, abounding in almost all kinds of timber. Oaks are 5 feet in diameter; black walnut and

poplar in abundance 5 and 6 feet in diameter and 20 to 70 feet below the first fork or limb; also ash, hickory, and chestnut of very large size. No market beyond home consumption. Forest-lands sell at 50 cents to $2 per acre. The principal timber in *Jackson* is white oak, yellow pine, and poplar, all of which abound. Oak-timber land, near market on the Ohio River, can be bought for $5 per acre; land timbered with yellow pine, $5 to $10 per acre. Not more than 25 per cent. of the land is improved, and on thousands of acres the timber has never been touched. *Wayne* has fully 256,000 acres in original forest. Oaks and poplars are the prevailing kinds. For each of these kinds the average price at Louisville and Cincinnati is 10 cents per cubic foot. The value of timber-land per acre varies from $5 to $50. Wood can be had in vast quantities for clearing it off the land. About 10 per cent. of the land in *Hancock* is in forest, two-thirds of which is white oak. The average value of the standing timber is $12 per acre. Wood is used in the county in the manufacture of brick and tile, and timber in furniture, wagons, &c. Very little timber is shipped. *Pocahontas* reports 300,000 acres in forest, 50,000 acres of which are in very valuable white and yellow pine, which can be bought at an average price of $2 per acre; 30,000 acres in yew and fir timber, valuable for shingles, 50 cents to $1 per acre; 100,000 acres in white oak, one-half of which is heavily timbered, and 100,000 acres of blue-grass lands, covered with beech, sugar-maple, ash, cherry, black walnut, and chestnut, heavily timbered and selling for $1 to $3 per acre. *Hampshire* reports much of the acreage in timber of hard woods and yellow pine. It is estimated that on lands which can be bought for $2.50 per acre, and are excellent for sheep-range, the timber, judiciously worked, would net $5 to $10 per acre. *Upshur* is heavily timbered with hard woods, the estimated average per acre being 3 M of lumber, 1,500 rails, and 30 cords of wood. Among the valuable varieties produced in *Kanawha* are the oaks, chestnut, poplar, hickory, black walnut, and cherry; also pitch-pine, hemlock, and spruce. The average value is $15 per acre. Half the timber is white oak.

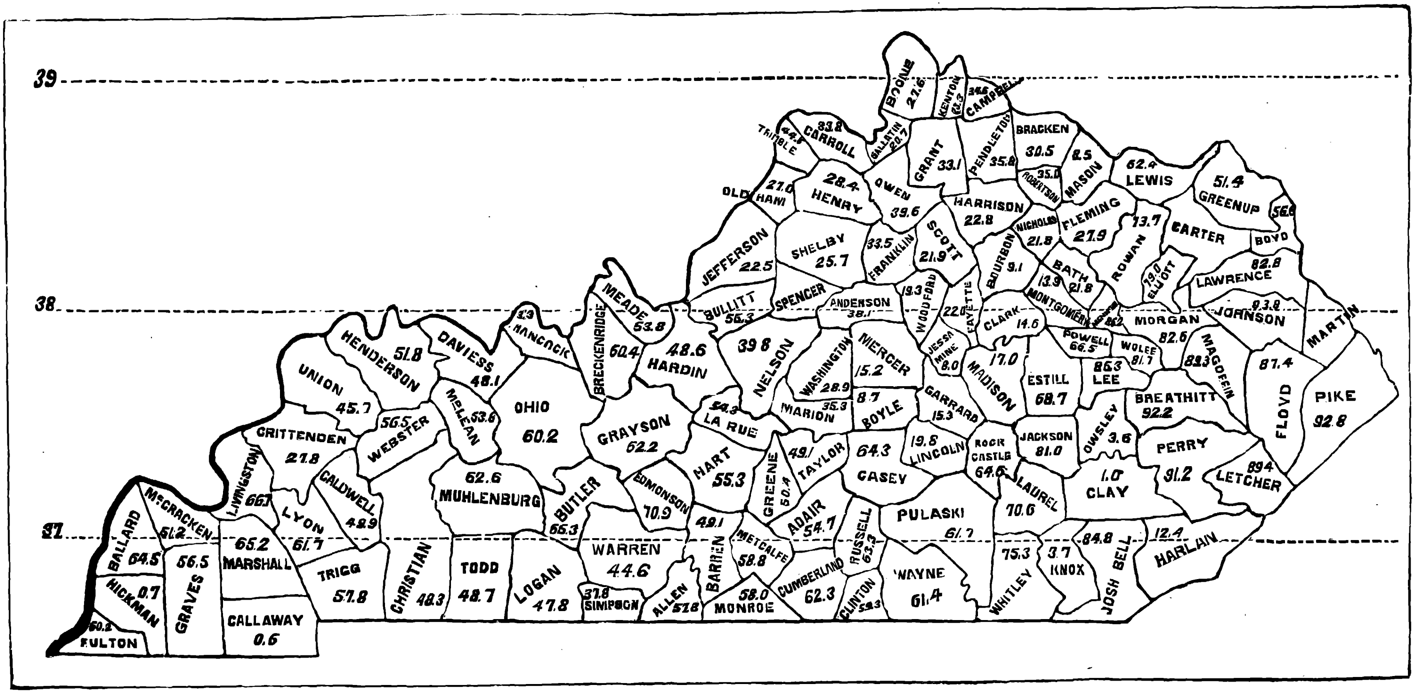
Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Barbour	120, 446	55. 7	Mineral	16, 420	9. 7
Berkeley	40, 004	25. 8	Monongalia	80, 519	41. 7
Boone	116, 689	83. 7	Monroe	164, 630	60. 3
Braxton	133, 479	71. 5	Morgan	63, 301	65. 0
Brooke	360	0. 6	Nicholas	122, 120	66. 8
Cabell	60, 802	54. 3	Ohio	14, 552	23. 8
Calhoun	67, 509	85. 6	Pendleton	169, 895	75. 8
Clay	627	0. 9	Pleasants	44, 545	70. 1
Doddridge	112, 040	74. 7	Pocahontas	6, 924	2. 0
Fayette	5, 658	2. 3	Preston	160, 074	57. 5
Gilmer	93, 586	79. 3	Putnam	74, 695	64. 7
Grant	113, 393	64. 2	Raleigh	148, 413	87. 6
Greenbrier	170, 748	57. 7	Randolph	188, 858	63. 5
Hampshire	163, 050	63. 6	Ritchie	112, 135	61. 2
Hancock	16, 941	33. 5	Roane	130, 289	51. 9
Hardy	127, 180	70. 9	Taylor	40, 457	42. 9
Harrison	134, 608	47. 4	Tucker	53, 017	80. 2
Jackson	100, 298	66. 7	Tyler	72, 861	61. 8
Jefferson	17, 898	16. 1	Upshur	95, 355	61. 4
Kanawha	164, 598	71. 1	Wayne	115, 548	74. 4
Lewis	110, 197	36. 1	Webster	62, 708	90. 0
Lincoln	84, 099	84. 3	Wetzel	77, 118	69. 1
Logan	666	0. 3	Wirt	75, 773	78. 5
Marion	25, 480	40. 5	Wood	94, 428	59. 8
Marshall	68, 992	46. 4	Wyoming	35, 876	78. 5
Mason	86, 426	56. 3			
McDowell	358	0. 5	Total	4, 364, 405	51. 1
Mercer	7, 762	2. 6			



WEST VIRGINIA.

KENTUCKY.—About half the area in *Livingston* is in forest, yielding an average of 35 cords per acre. The principal kinds are oak, poplar, and gum. *Owsley* is reported as one of the heaviest-timbered counties in the West. The most valuable kinds are poplar, pine, black walnut, cherry and white oak. All these kinds are being cut and rafted down the Kentucky River. Black walnut is also abundantly shipped to Cincinnati, Indianapolis, Chicago, and to Europe. There is scarcely mill or machinery in the county for working up lumber. The poorest land in the county is covered with valuable pine-forests. In *Taylor*, 33 per cent. of the land is in mixed forests, the oaks being prominent. "As a general thing, the undergrowth is cut out and the large timber is deadened and then burned on the ground, with enormous labor. Near the towns, timber is worth $2 per cord for wood." About one-third of *McLean* is in forest, much of it on low bottoms, principally of oak, gum, and hickory. The ridges are covered with oak and poplar. Logs from the latter are rafted, and staves from the former are shipped to market. *Graves* has little timber except along the water-courses. *Hardin* has a large growth of oaks of different kinds. Wood near the railroad is worth, in the tree, 75 cents per cord. The timber distant from market has almost no money-value. *Jackson* abounds in oak, pine, poplar, and black walnut, which, with a way open to market, would be very valuable. *Calloway* has a large amount of valuable hard-wood timber of different kinds, but lacks market facilities. About 10 per cent. of *Gallatin* is in forest growth, divided into original untouched forest, timber left standing on blue-grass pasture, and a young growth of black locust on worn-out lands. Foremost among the varieties are sugar-maple, black walnut, and honey-locust. The finest of black-walnut trees are split into fence-rails, there being as yet no market open for this valuable timber. Much attention is given to the growing of black locust, which, on the limestone soil, to which it is well adapted, grows rapidly and so thick that, besides an immense number of fence-stakes, 400 to 500 posts, worth 25 cents each, can be cut per acre. Our correspondent states that the best farmers are reclaiming and making valuable worn-out and worthless lands by letting them grow up to timber. On his own farm, a lot of 30 acres having been cultivated until it would produce nothing, was abandoned 25 years ago; now it is the most valuable part of the farm, being covered with forest-timber, a large portion of which is of the finest quality, and closely sodded over with blue-grass. He says, "For the last fifteen years I could have rented the land for pasture at an average of $3 per acre." Half the land in *Kenton* is in mixed forests, 25 per cent. of the growth being oak. The average yield is 70 cords per acre, worth 70 cents per cord in the tree. There is considerable black walnut and ash; rails from the latter are worth $75 per thousand, and can be manufactured at a cost of $10 per thousand. *Marion* is well supplied with poplar timber, which, at the mill, is worth $12.50 per M. Oak, walnut, and ash are foremost among the other timbers. *Cumberland* reports 60 per cent. of its area in forest, affording "a plenty of timber and wood for ages." Forty per cent. of the land in *Breckinridge* is timbered. On the ridges, it is being sawed by portable mills at a rapid rate. *Metcalfe* reports 75 per cent. of the land in forests, in which oaks and poplar of the largest size and finest quality abound. *Adair* is heavily timbered. On many acres are 40 to 50 large poplar-trees. Remote from towns, the forest growth is given to those who will clear it off. *Boone* returns 41,000 acres in forest, valued at $25 per acre. In the list of varieties, black walnut is placed first. In *Madison*, the forests are limited to a bare sufficiency for fire-wood and fencing. In *Garrard*, also, timber is very scarce. The north

half of *Logan* has a dense, heavy growth of hard wood. Many saw-mills are at work, and quite a trade has recently sprung up in large walnut timber, which sells, standing, at from $1 to $20 per tree. There is also considerable business in getting out cross-ties, rails, and timber for ax-handles. The south part, originally "barrens or prairie," now is covered with a growth of post and white oak, intermixed with walnut, hickory, and cedar. It is not yet large enough for rails, but ample for firewood. *Laurel* reports two-thirds of the area, or about 320,000 acres, in forest, the greater part of which is heavily timbered; in the eastern half, largely with the oaks, poplar, and hickory; in the western, with very valuable yellow pine and chestnut. Pine and poplar lumber is worth $10 to $15 per M; walnut, $30. Wood often sells for the cost of cutting. *Hart* has 200,000 acres in forest growth. The oaks and poplar are the most valuable. There are ten saw-mills in the county, and near them, or the railroad, good timber sells at 40 cents per cord; 20 cents is a fair average for the county. Half the land in *Ballard* is finely timbered with oak and poplar, mixed with many other kinds. About 30 per cent. of the area in *Bath* is reported as in hard-wood forests, yielding 100 cords per acre. Lumber, at the mills, sells at $10 to $15 per M. The oak and black walnut are of superior quality. About one-third of the forest-area will cut, per acre, 30 M of merchantable lumber. In *Pendleton*, since 1860, more than one-third of the timber has been destroyed in clearing the land for tobacco, which is charged with injuring the county by the destruction of timber, by a rapid exhaustion of land, and by fearfully fostering ignorance in the rising generation in the way of pre-occupying with work the time for schooling. The opinion is expressed that by improving the fine water-power by manufactories, the timber of the county would be speedily quadrupled in value. *Scott* has only timber for fencing, and imports its building-lumber. The area in forests in *Anderson* is estimated at 42,000 acres, more than half of which has been divested of its large timber. The leading kinds are white oak, poplar, and black walnut. There are many groves of black locust, which is easily grown. *Christian* County was formerly "barren," and its forests have grown up since the suppression of prairie-fires. They are consequently generally too small for timber, but are estimated to average 100 cords of wood per acre. The kinds are oak and hickory, with a sprinkling of beech, walnut, maple, and poplar. *Lewis* reports 300,000 acres in original forest; oaks and poplar up to 5 feet in diameter, with all the other kinds of hard wood. The best half of *Fleming* has little timber beyond what is needed for farm use. About one-third of the territory is mountainous, and covered with a dense growth, principally of poplar and black and white oak. The northern slopes of the mountain forests, which produce the best quality of tobacco, are now being bought up by tobacco-men from other counties. Half the area of *Russell* is in forests of white oak, chestnut, poplar, &c. Many of the yellow poplars are 6 feet in diameter at the base and 4 feet 80 feet above. Forest-lands vary in value from $2 to $40 per acre. *Oldham* reports 25 per cent. of the area in forests of oak, poplar, and other valuable growths. The yield is 60 to 70 cords per acre. There are planted groves of black locust, worth not less than $300 per acre. In *Shelby*, there are about 16,000, covered chiefly with ash, cherry, black walnut, mulberry, white oak, and poplar. Average value of standing wood, $1.50 per cord; yield, 20 cords. The forests have been thinned so as to promote a free growth of blue-grass. Coal is extensively used for fuel. *Monroe* claims "the finest poplars in the world." The forests are dense and the timber large, including black walnut and cherry. On "Peters Creek" is a centennial beech-tree,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BOONE 27.6
KENTON 63.3
CAMPBELL 34.6
GALLATIN 20.7
TRIMBLE 44.8
CARROLL 33.8
GRANT 33.1
PENDLETON 35.8
BRACKEN 30.5
MASON 8.5
ROBERTSON 35.0
LEWIS 62.4
GREENUP 51.4
BOYD 56.6
OLDHAM 27.0
HENRY 28.4
OWEN 39.6
HARRISON 22.8
NICHOLAS 21.8
FLEMING 27.9
ROWAN 13.7
CARTER
ELLIOTT 79.0
LAWRENCE 82.8
JEFFERSON 22.5
SHELBY 25.7
FRANKLIN 33.5
SCOTT 21.9
BOURBON 9.1
BATH 21.8
MONTGOMERY 13.9
MORGAN 82.6
JOHNSON 93.8
MARTIN
BULLITT 56.3
SPENCER
ANDERSON 38.1
WOODFORD 19.3
FAYETTE 22.0
CLARK 14.6
POWELL 66.5
WOLFE 81.7
MAGOFFIN 89.3
MEADE 53.8
HANCOCK
BRECKENRIDGE 60.4
HARDIN 48.6
NELSON 39.8
WASHINGTON 28.9
MERCER 15.2
JESSAMINE 8.0
MADISON 17.0
ESTILL 68.7
LEE 86.3
BREATHITT 92.2
FLOYD 87.4
PIKE 92.8
HENDERSON 51.8
DAVIESS 48.1
UNION 45.7
McLEAN 53.6
OHIO 60.2
WEBSTER 56.5
GRAYSON 62.2
LA RUE 54.3
MARION 35.3
BOYLE 8.7
GARRARD 15.3
ROCK CASTLE 64.6
JACKSON 81.0
OWSLEY 3.6
PERRY 91.2
LETCHER 89.4
CRITTENDEN 27.8
MUHLENBURG 62.6
HART 55.3
GREENE 50.4
TAYLOR 49.1
CASEY 64.3
LINCOLN 19.8
CLAY 1.0
EDMONSON 70.9
LIVINGSTON 66.1
CALDWELL 49.9
LYON 61.7
BUTLER 65.3
McCRACKEN 51.2
BALLARD 64.5
MARSHALL 65.2
GRAVES 56.5
ADAIR 54.7
RUSSELL 63.3
PULASKI 61.7
LAUREL 70.6
BARREN 49.1
METCALFE 58.8
WARREN 44.6
TRIGG 57.8
CHRISTIAN 48.3
TODD 48.7
LOGAN 47.8
SIMPSON 37.8
ALLEN 57.8
MONROE 58.0
CUMBERLAND 62.3
CLINTON 59.3
WAYNE 61.4
WHITLEY 75.3
KNOX 3.7
BELL 84.8
HARLAN 12.4
HICKMAN 0.7
FULTON 60.2
CALLAWAY 0.6

KENTUCKY.

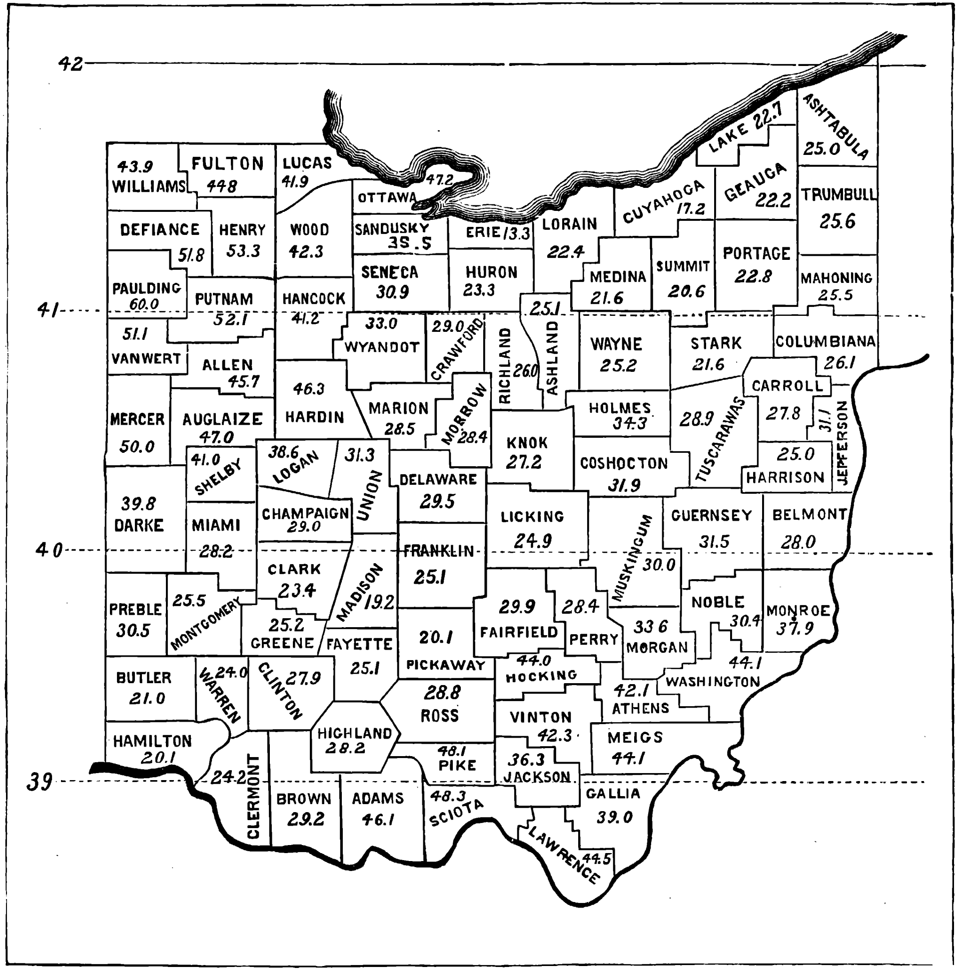
having carved upon it, in very ancient-looking characters, "D. Boone, 1776." About half the land in *Greenup* is in forest. From half of this the wood has been cut off and made into charcoal for the iron-furnaces in the county, and another crop is growing up, which will equal the original in twenty to thirty years. The average yield of original forest is 40 cords, and the average value $10 per acre. For the last ten or fifteen years ten saw-mills have used up most of the poplar and black walnut. The price of lumber, at the mills, is, for poplar and white oak, $15 per M; black walnut, $20 to $50; gum, &c., $12.50. At the chair and furniture factory, sugar-maple and other furniture-wood bring $3 per cord. About one-third of *Warren* is covered with forest; the lowlands with a heavy growth of the prevailing hard-wood varieties, and "the grown-up barrens" with shell-bark, hickory, and oaks. A steam-factory employs about thirty hands in making handles for axes and picks, for the European market.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adair	95,747	54.7	Larue	82,061	54.3
Allen	104,739	57.3	Laurel	113,259	70.6
Anderson	37,646	38.1	Lawrence	160,385	82.8
Ballard	132,828	64.5	Lee	67,916	86.3
Barren	136,355	49.1	Letcher	173,014	89.4
Bath	33,103	21.8	Lewis	57,063	62.4
Boone	41,005	27.6	Lincoln	25,981	19.8
Bourbon	17,569	9.1	Livingston	83,514	66.7
Boyd	30,901	56.6	Logan	127,589	47.8
Boyle	6,084	8.7	Lyon	52,512	61.7
Bracken	33,299	30.5	Madison	48,755	17.0
Breathitt	259,119	92.2	Magoffin	206,036	89.3
Breckinridge	170,091	60.4	Marion	59,494	35.3
Bullitt	79,818	56.3	Marshall	112,658	65.2
Butler	122,429	65.3	Mason	10,894	8.3
Caldwell	90,708	49.9	McCracken	47,134	51.2
Calloway	1,112	0.6	McLean	54,052	53.6
Campbell	24,723	34.6	Meade	92,109	53.8
Carroll	25,974	33.8	Menifee	71,110	86.2
Carter	....	....	Mercer	19,698	15.2
Casey	123,095	64.3	Metcalfe	73,489	58.8
Christian	142,883	48.3	Monroe	95,967	58.0
Clarke	20,686	14.6	Montgomery	13,576	13.9
Clay	2,685	1.0	Morgan	179,977	82.6
Clinton	60,938	59.3	Muhlenburgh	146,605	62.6
Crittenden	50,173	27.8	Nelson	92,692	39.8
Cumberland	67,525	62.3	Nicholas	25,399	21.8
Daviess	107,226	48.1	Ohio	178,606	60.2
Edmonson	71,365	70.9	Oldham	32,107	27.0
Elliot	95,590	79.0	Owen	83,728	39.6
Estill	103,609	68.7	Owsley	4,583	3.6
Fayette	35,747	22.0	Pendleton	46,740	35.8
Fleming	51,403	27.9	Perry	183,920	91.2
Floyd	196,116	87.4	Pike	400,945	92.8
Franklin	32,176	33.5	Powell	26,126	66.5
Fulton	47,489	60.2	Pulaski	216,879	61.7
Gallatin	11,836	20.7	Robertson	19,220	35.0
Garrard	16,956	15.3	Rock Castle	95,708	64.6
Grant	39,886	33.1	Rowan	56,111	73.7
Graves	146,430	56.5	Russell	69,802	63.3
Grayson	157,942	62.2	Scott	28,263	21.9
Greene	70,278	50.4	Shelby	58,266	25.7
Greenup	25,334	51.4	Simpson	45,152	37.8
Hancock	3,422	3.3	Spencer	37,259	30.6
Hardin	126,410	48.6	Taylor	70,011	49.1
Harlan	28,251	12.4	Todd	89,765	48.7
Harrison	36,314	22.8	Trigg	120,588	57.8
Hart	107,009	55.3	Trimble	29,104	44.8
Henderson	114,083	51.8	Union	61,340	45.7
Henry	39,614	28.4	Warren	110,046	44.6
Hickman	712	0.7	Washington	53,649	28.9
Hopkins	120,435	55.6	Wayne	191,328	61.4
Jackson	88,352	81.0	Webster	92,390	56.5
Jefferson	46,135	22.5	Whitley	189,898	75.3
Jessamine	6,118	8.0	Wolfe	93,338	81.7
Johnson	167,111	83.8	Woodford	16,235	19.3
Josh Bell	102,798	84.8			
Kenton	20,415	23.3			
Knox	12,815	3.7	Total	9,134,658	48.9

OHIO.—The forests of this State are almost exclusively deciduous. In a few localities yellow pine is reported, but there is scarcely mention of any other conifer or evergreen. The oaks, black walnut, hickory, and poplar are its most valuable as well as most prevalent timbers. While its pervading mechanical industries greatly enhance the value of land for agriculture by increasing the ratio of consumers to that of producers, and by saving the farmer cost of transportation on both his products and his farming-implements, they at the same time greatly increase the value of all forest-products by creating a ready market near at hand. One-fifth of the land in *Fulton* is in forests, though much of the oak has died. Average yield, 40 cords per acre; price, $3 per cord. The yield in *Lawrence* is 40 cords. The principal timber, oak and poplar. Large quantities of pig-iron are made in the county, and wood is manufactured into charcoal for that purpose. In *Mercer*, wood sells, at Celina, for $2.25 per cord; ash-lumber, $20 per M; oak, $15. *Summit* has no original growth except reserved wood-lots and sugar-orchards. The forests in *Miami* are reduced to narrow limits; within three years 6,000 M feet in walnut-logs have been exported. Walnut timber, at railroad-stations, brings $45 per M; wood, $3.50 to $4 per cord. *Morgan* is heavily timbered. Oak predominates, followed by great quantities of very large yellow poplar; 126 trees over 2½ feet in diameter, with very long and fine trunks, have been counted on an acre. *Pike* estimates 75 per cent. of the land in forests, yielding 150 cords per acre. Hickory-lumber is worth $20 per M; other kinds, $10. In *Perry*, the most valuable kinds are black walnut, poplar, and white oak. The best forests of poplar and oak are worth $50, $75, and upward, per acre. At the mills, walnut-lumber is worth $45 per M; poplar, $20; white oak, $15. In *Delaware*, oak is the standing timber for almost all purposes; the lumber is worth $13 to $15 per M. Black walnut and black hickory, once thought inexhaustible, are becoming scarce and high. Immense quantities of walnut, and some hickory, have been shipped to Austria, via Boston. The prices range from $30 to $60 per M. About 25 per cent. of the land in *Carroll* is in forests, chiefly of white oak. The value of the standing timber is from $20 to $100 per acre. The best forests in *Erie* yield 125 cords per acre. Large white oaks are worth, standing, $5 to $15 per tree; wood, delivered, $3 to $5 per cord. The county produces black walnut and hickory of excellent quality; 25 per cent. of the area is forest. Two-thirds of *Marion* was prairie at the time of settlement, with small, scattered patches of oak and hickory; about three townships were heavily timbered. Within ten years, quantities of black walnut have been shipped east in logs, and last year much oak, said to be for Germany. *Logan* reports 20 per cent. in forests, yielding 40 to 50 cords per acre, and valued at $15 to $25 per acre. Among the varieties are oak, black and white walnut, and hickory. In *Sandusky*, standing timber is worth $40 to $100 per acre. Black walnut, white wood, and oak are the principal kinds, worth, at the mill, for lumber, $10 to $12 per M. Yield in wood, after removal of timber, 30 to 50 cords per acre; worth, in the tree, 50 cents to $1 per cord. The heaviest forests in *Lucas* yield, per acre, 5 M of timber and 60 cords of wood, worth, standing, $30 per acre. In *Trumbull*, very little timber is left. *Seneca* reports about 115,200 acres in forest, of oak, walnut, etc. Large quantities of oak and walnut lumber are shipped east. In *Montgomery*, "insects have deadened a great deal of ash and hickory timber within a few years." The value of original forests is placed at $200 to $300 per acre. Forests occupy 33 per cent. of the land. In *Belmont*, more than half the wood is oak; the average value, $50 per acre. In *Licking*, 40 per

cent. of the forest yield being timber, worth $15 to $20 per M, and 60 per cent. wood, amounting to 20 cords per acre, worth, in market, $2 per cord. *Richland* reports 70,000 in forest, which include about all the hard woods of the climate. In *Defiance*, the forests yield 60 to 100 cords per acre. Large quantities of oak hubs and spokes and "hickory butts" are marketed. In *Stark*, the forests average 70 cords per acre, half of which is fit for timber. *Clermont* has 50,000 acres in forests, mostly in farm-lands. The oaks, poplar, black walnut, and other timber are very large and well husbanded. Exclusive of the timber, the average yield of wood is about 50 cords per acre, worth, in market, $2 to $4 per cord; poplar-lumber, $20 to $30 per M; oak, $15 to $25; black walnut, $25 to $50. In *Jackson*, 40 per cent. of the area remains in forest, yielding 45 cords per acre, worth, standing, 40 cents per cord. The chief demand for wood is for the manufacture of salt, and for charcoal used in manufacturing iron. In the northwest part of the county a considerable quantity of yellow pine is being profitably worked up by portable steam saw-mills. *Hancock* reports 40 per cent. of the area, or 128,000 acres, in forest, and about half of that in the primitive state. The other half is so thinned that it serves for pasture-land. Exclusive of the valuable timber, the best forests yield 100 cords of wood per acre, but the average is about 50; the average value, $50 per acre. All the varieties of timber are utilized in varied manufactures. *Gallia* returns nearly 40 per cent. of the land in mixed forests, which include yellow pine. Average value of the timber $15 per acre, mostly devoted to home uses, but some wood and staves are shipped. About 33 per cent. of the land in *Vinton* is in timber, yielding 25 to 50 cords per acre, and the average value $25 per acre. A great amount is manufactured into lumber. *Ashland* was originally densely timbered with the most valuable kinds; about 75,000 acres remain, from which the better grades are being culled, but with due care there is "sufficient for all time to come." The value varies from $20 to $150 per acre. Oak-lumber is worth $20 to $25 per M; black walnut is shipped at $30 to $50 per M. The yield of wood varies from 20 to over 100 cords per acre. Different kinds of hard-wood lumber for finishing the inside of dwellings are constantly ncreasing in use and popularity. *Preble* reports about 52,000 acres in forest. The walnut has been nearly all marketed, principally for veneering. The oak has been badly killed within a few years by a caterpillar. Near market, the average price of timber is $35 per acre; wood, delivered, $3 per cord. The ash has been mostly used up in the manufacture of furniture. About 10 per cent. of the land in *Mahoning* is in timber, of which the most valuable kinds are oaks and black walnut. In the southern part, the value of timber, per acre, is $30; in the northern part, less. *Portage* reports 25,000 acres, being about 10 per cent., in forests, from most of which the timber has been somewhat culled. The heaviest portion is beech and maple. The average yield is placed at 3 M of lumber, worth $10 per M on the stump, and 30 cords of 18-inch wood, worth 38 cents per cord, standing. The timber in the best forests is worth, standing, $100 per acre. In the 52,000 acres of forest reported in *Geauga*, the value of the standing wood, exclusive of the timber, is placed at $25 per acre. Standing trees of white-wood, cucumber, and ash, suitable for lumber, are worth $10 to $20 per tree; white oak and elm, $5 to $10. The timber left in *Pickaway* is very limited. Steam saw-mills in different parts of the county are working it up. Good pine-lumber for fencing can be bought by the car-load for $15 per M, and at that rate it is believed that it does not pay to keep good corn-land in timber. *Henry* was originally one of the heaviest timbered counties in

the State, lying within what is known as the "black swamp." But within five miles of the navigable streams all the most valuable timber has been either destroyed or cut off. *Guernsey* also was originally very heavily timbered, oak largely predominating; about 20 per cent. of the land is left in forest, the larger portion carefully preserved. The price paid per acre for all timber fit for sawing is $25 to $40. This being a coal region, wood is scarcely worth more than the cost of cutting and hauling. In *Holmes*, the forests are largely of oak, and approximate 100 cords per acre. In *Coshocton*, the black and white walnut and sugar-maple from the heavily timbered bottom-lands, and the poplar from the uplands, have been nearly all removed. A second growth of chestnut, oak, and hickory is growing rapidly on the uplands, from which timber of the first growth has been cut off. Owing to the presence of coal, there is no market for wood. It is thought that the county ought not to export any timber. Only about 6 per cent. of *Hamilton* is in forest, averaging about 40 cords per acre. In *Adams*, the leading timbers are white and black oak, and the average yield of forests 33 cords per acre. *Tuscarawas* reports 96,000 acres in forest, mostly of oak, and the average value, including the land, $40 per acre. In *Harrison*, 25 per cent. of the land is in forests of oaks, with some rock-maple, black walnut, ash, and locust; value of the standing timber, $15 to $20 per acre. *Monroe* has 69,000 acres in forests of poplar, oak, and walnut, averaging 4 M per acre, and worth $20 per M; or 45 cords of wood per acre, making the net value of forest-products per acre near $80. The best forests yield 200 cords per acre. *Putnam* has about 102,000 acres in forest, on which the estimated value of wood and timber is about $12.50 per acre. *Franklin* reports 80,000 in forest, most of which has been thinned out, and the county has not now enough timber for the home demand. The little primitive forest left will yield 125 to 200 cords per acre. In *Greene*, the forests appear to be in a decaying state, attributed, in part, to several severe droughts, but more to destruction of undergrowth by close pasturing, so that the light, loose surface, covered with leaves, is superseded by a tough, green sward. The 73,000 acres of forest-lands in *Ottawa* average 65 cords per acre. The average price of standing wood is $2 per cord; but many thousand cords are sold for more, to be manufactured into staves, hubs, handles, and other articles. *Hardin* reports that about one-half of the area is covered with forests, which are rapidly disappearing. Much timber is being worked into staves, cross-ties, &c. *Auglaize* also reports about half the land in forest, in which the valuable timbers are walnut, oak, hickory, and ash, and the average value $20 per acre. Wood sells at $2.25 per cord. The average value of forest-products in the tree, in *Madison*, is placed at $10 per acre. *Wayne* estimates 95,000 acres in woodland, yielding 100 cords per acre, and worth $100 per acre. The primitive forests of oak, hickory, ash, &c., in *Butler* yielded 50 to 75 cords per are. About 30,000 acres are left, but most of it more or less thinned. *Preble* has 45,000 to 50,000 acres yet remaining in original forest. The timber is generally large and tall; poplar, oak, and other varieties attaining a diameter of 5 and 6 feet. A large portion yields 100 to 125 cords per acre, and the timber alone is valued at $75 to $100 per acre. Much attention is now paid to the protection of forests, but in some localities they appear to be dying out. In *Williams*, large quantities of oars are manufactured from white ash, and shipped. The timber for this purpose is worth $10 per M, in the log. The average value of timber is $24 per acre. In *Huron*, about 12½ per cent. of the land is in timber, and the average value of such land, $50 per acre. Lumber is worth $12 to $20 per M; wood, $2.50 to $3.50 per cord. *Medina* has not now more than 15 per



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43.9 WILLIAMS
FULTON 448
LUCAS 41.9
47.2
OTTAWA
DEFIANCE 51.8
HENRY 53.3
WOOD 42.3
SANDUSKY 35.5
ERIE 13.3
LORAIN 22.4
CUYAHOGA 17.2
GEAUGA 22.2
LAKE 22.7
ASHTABULA 25.0
TRUMBULL 25.6
PAULDING 60.0
PUTNAM 52.1
HANCOCK 41.2
SENECA 30.9
HURON 23.3
MEDINA 21.6
SUMMIT 20.6
PORTAGE 22.8
MAHONING 25.5
51.1 VANWERT
ALLEN 45.7
33.0 WYANDOT
29.0 CRAWFORD
RICHLAND 26.0
25.1 ASHLAND
WAYNE 25.2
STARK 21.6
COLUMBIANA 26.1
46.3 HARDIN
MERCER 50.0
AUGLAIZE 47.0
MARION 28.5
MORROW 28.4
KNOK 27.2
HOLMES 34.3
28.9 TUSCARAWAS
CARROLL 27.8
31.1 JEFFERSON
COSHOCTON 31.9
25.0 HARRISON
41.0 SHELBY
38.6 LOGAN
31.3 UNION
DELAWARE 29.5
39.8 DARKE
MIAMI 28.2
CHAMPAIGN 29.0
LICKING 24.9
GUERNSEY 31.5
BELMONT 28.0
MUSKINGUM 30.0
FRANKLIN 25.1
CLARK 23.4
MADISON 19.2
PREBLE 30.5
25.5 MONTGOMERY
25.2 GREENE
FAYETTE 25.1
20.1 PICKAWAY
29.9 FAIRFIELD
28.4 PERRY
33.6 MORGAN
NOBLE 30.4
MONROE 37.9
44.0 HOCKING
44.1 WASHINGTON
BUTLER 21.0
24.0 WARREN
CLINTON 27.9
28.8 ROSS
42.1 ATHENS
VINTON 42.3
MEIGS 44.1
HIGHLAND 28.2
HAMILTON 20.1
48.1 PIKE
36.3 JACKSON
24.2 CLERMONT
BROWN 29.2
ADAMS 46.1
48.3 SCIOTA
GALLIA 39.0
LAWRENCE 44.5

PLATE XLVII.

cent. of the once unbroken dense forest of large growth, and that greatly thinned and annually decreasing. Wood is becoming scarce, and coal is taking its place. *Meigs* has some tracts of oak, poplar, and yellow pine left. Coal is chiefly used for fuel. *Fayette* reports about 75,000 acres in forest, averaging 40 cords per acre, worth, in the cord, $2, and timber worth $10 per acre. In *Lorain*, the standing timber on 5 acres sold for an average of $209.70 per acre. The tract was about an average for the north part of the county. From *Brown*, the forests are rapidly disappearing, the black walnut, poplar, and a large portion of the oak being already gone. Forests now cover about 20 per cent. of the land. Wood is worth $3.67 per cord.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adams	133, 707	46. 1	Logan	94, 304	38. 6
Allen	102, 109	45. 7	Lorain	66, 908	22. 4
Ashland	64, 419	25. 1	Lucas	47, 559	41. 9
Ashtabula	91, 203	25. 0	Madison	42, 513	19. 2
Athens	112, 406	42. 1	Mahoning	61, 981	25. 5
Auglaize	88, 568	47. 0	Marion	62, 165	28. 5
Belmont	87, 254	28. 0	Medina	54, 092	21. 6
Brown	83, 171	29. 2	Meigs	99, 743	44. 1
Butler	51, 234	21. 0	Mercer	111, 881	50. 0
Carroll	70, 937	27. 8	Miami	64, 807	28. 2
Champaign	70, 033	29. 0	Monroe	111, 946	37. 9
Clark	52, 168	23. 4	Montgomery	65, 635	25. 5
Clermont	60, 060	24. 2	Morgan	82, 091	33. 6
Clinton	62, 477	27. 9	Morrow	69, 093	28. 4
Columbiana	79, 323	26. 1	Muskingum	115, 880	30. 0
Coshocton	106, 616	31. 9	Noble	72, 217	30. 4
Crawford	65, 271	29. 0	Ottawa	41, 904	47. 2
Cuyahoga	41, 446	17. 2	Paulding	42, 082	60. 0
Darke	132, 500	39. 8	Perry	71, 643	28. 4
Defiance	89, 997	51. 8	Pickaway	68, 821	20. 1
Delaware	79, 926	29. 5	Pike	96, 088	48. 1
Erie	18, 374	13. 3	Portage	62, 683	22. 8
Fairfield	91, 709	29. 9	Preble	76, 081	30. 5
Fayette	61, 646	25. 1	Putnam	89, 932	52. 1
Franklin	68, 478	25. 1	Richland	88, 582	26. 0
Fulton	77, 624	44. 8	Ross	93, 978	28. 8
Gallia	100, 037	39. 0	Sandusky	80, 852	35. 5
Geauga	52, 521	22. 2	Scioto	80, 908	48. 3
Greene	57, 675	25. 2	Seneca	98, 541	30. 9
Guernsey	97, 298	31. 5	Shelby	92, 272	41. 1
Hamilton	40, 275	20. 1	Stark	69, 559	21. 6
Hancock	122, 409	41. 2	Summit	45, 911	20. 6
Hardin	85, 438	46. 3	Trumbull	89, 444	25. 6
Harrison	53, 217	25. 0	Tuscarawas	97, 023	28. 9
Henry	78, 149	53. 3	Union	72, 131	31. 3
Highland	87, 559	28. 2	Van Wert	82, 885	51. 1
Hocking	104, 024	44. 0	Vinton	72, 385	42. 3
Holmes	84, 540	34. 3	Warren	56, 860	24. 0
Huron	61, 499	23. 3	Washington	146, 100	44. 1
Jackson	74, 268	36. 3	Wayne	82, 807	25. 2
Jefferson	75, 656	31. 1	Williams	102, 671	43. 9
Knox	91, 269	27. 2	Wood	94, 554	42. 3
Lake	30, 576	22. 7	Wyandot	61, 101	33. 0
Lawrence	69, 301	44. 5			
Licking	94, 195	24. 9	Total	6, 883, 575	31. 7

MICHIGAN doubtless exceeds all the other States in the relative extent and yield of white-pine forests. The southern portion of the State produces large quantities of superior black walnut. The forests in *Berrien* include every variety grown in the State. Great quantities of black walnut and cherry have been shipped East, but a large amount still remains.. Many oak ties have been exported, and much timber for ship-building. In *Antrim*, the forests yield 40 cords per acre, worth, standing, 25 cents per cord. Wood is shipped to Chicago and Milwaukee, and over 30,000 cords are annually used by the furnace at Elk Rapids. Birdseye and curly maples are among the timber. *Iosco* reports 6 per cent. of the land in forests, the best of which yields 20 M of pine-lumber.

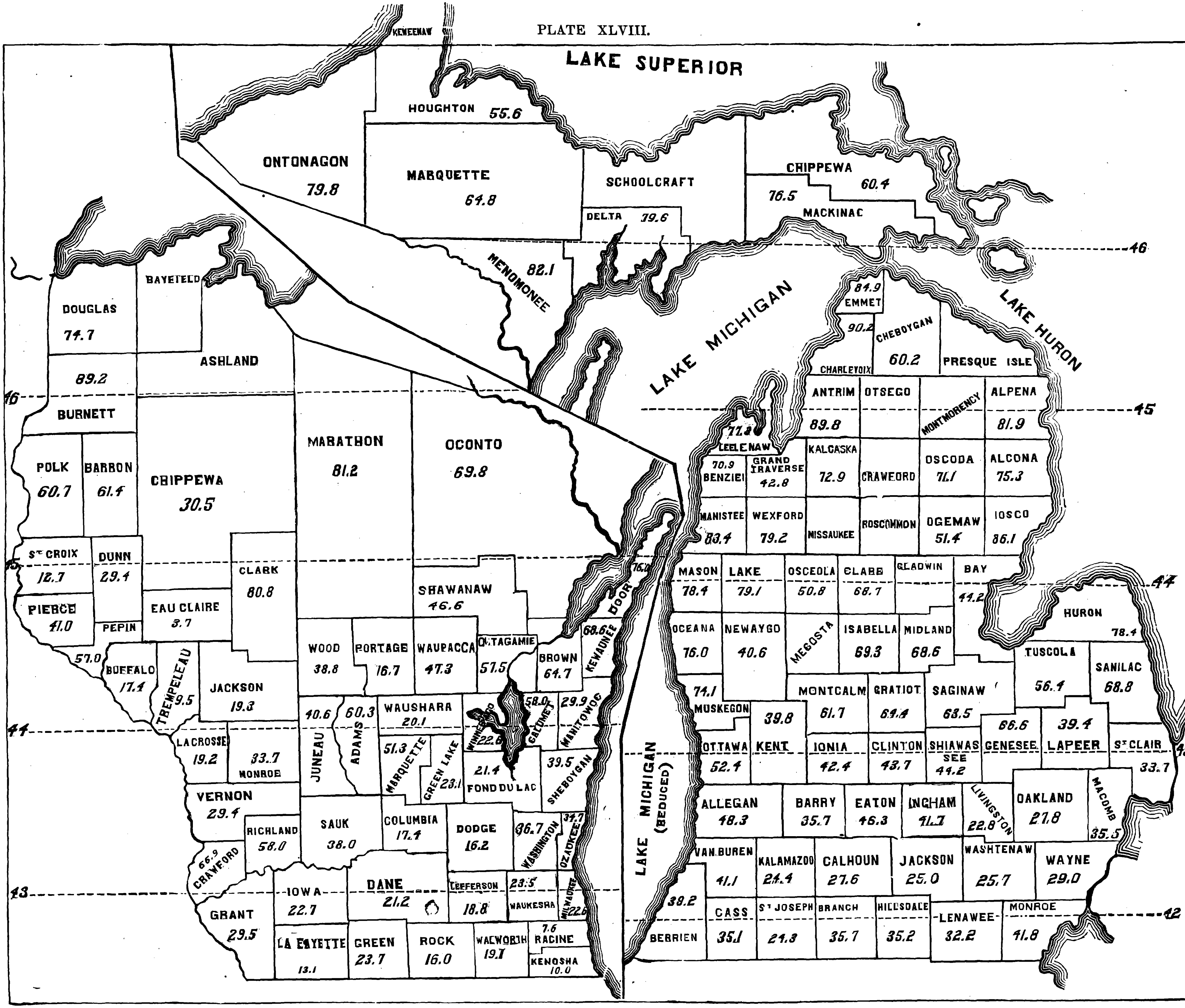
Standing wood is worth 50 cents per cord. The forests contain, besides, pine, hemlock, cedar, ash, oak, etc. In *Montcalm*, 14 out of the 20 townships are mostly covered with pine, intermixed with beech, maple, and white oak. About half the pine has been cut. The timber left on the land is worth from $15 to $100 per acre. In the other six townships 67 per cent. of the land is improved, and the remainder covered with very heavy hard-wood timber, worth an average of $35 per acre. From *Benzie*, the pine has been mostly cut off. The prevailing growth on the upland is the sugar-maple, and the average yield 50 cords per acre. In *Marquette*, along the line of the railroad, the timber has been removed from about 60,000 acres for blast-furnace consumption. South of the railroad, the timber has been destroyed from 180,000 to 200,000 acres by wind and fire. The remainder of the land is timbered, and will yield, per acre, 2 M of white and Norway pine and 30 cords of wood. Tracts of pine will yield 25 M per acre, and tracts of hard wood, 50 cords per acre. In *Wayne*, the forests are made up of deciduous varieties. The average yield of wood is 50 cords per acre, worth $1 per cord in the tree; the net value of lumber, $12 per M. In *Saginaw*, large quantities of oak are shipped, in square timber, to Quebec and New York. Within the last two or three years ash-hoops have been shipped to Massachusetts at the rate of one to two car-loads per week. There is also a factory near the line of the county which manufactures coils of hoops out of white elm. The barrel-factories pay for elm $6 to $7 per M, and for white ash $8 to $9 per M for stave-timber. The yield per acre is 50 to 125 cords, the most of which is being burned on the ground, as it will not pay to haul more than eight or ten miles. The eastern half of *Van Buren* was originally "oak openings," and the western, timber, with hard woods, among which were black walnut and cherry. On tracts from which the timber has not been cut, that alone will bring $50 to $60 per acre. But within ten years the most of the timber has been converted into lumber. Common woodland is valued at $15 to $18 per acre, averaging 50 cords, worth $1 per cord. Mill-men pay $10 to $11 per M for white-wood logs, delivered at the mill. The remaining timber is rising in value rapidly. *Washtenaw* reports 169,000 acres in forests, in which oak predominates. The average yield per acre is 40 cords, and the price of wood, delivered, $5 per cord. Land in forest is worth more than improved, the timber alone being often worth $100 per acre. The white and Norway pine timber in *Alcona* is estimated at 2,000,000 M feet. Pine-lands, distinctively, yield 2½ to 50 M per acre; in many instances 2,000 M have been cut from an 80-acre lot. A swamp contains from 500,000 to 1,500,000 cords of cedar suitable for post and paving timber. Cedar, on the railroad, is worth $3.50 to $4 per cord. In *Grand Traverse*, rock-maple is most abundant, yielding 40 to 50 cords per acre of timber clear from knots. Pine comes next, and after that a variety of very tall and straight elm, the clean trunks sometimes being of nearly uniform diameter for 50 feet from the stump. These trees, mostly used for ship-timber, sell for $1 per tree, standing. On most of the hard-wood land the timber is burnt to get it out of the way. *Hillsdale* reports 25 per cent. of the land yet in forests, yielding an average of 60 cords per acre, though many hundred acres yield twice that. White wood, black walnut, and cherry are among the valuable kinds. The original forests in *Ottawa* were very heavy, and included nearly all the kinds of timber in the State. Vast quantities are still left. In *Branch*, most of the white-wood and black walnut have been cut off, but bass-wood, oak, ash, and elm are still plenty. Staves are largely manufactured. The average yield is 60 cents. *Delta* returns over 460,000 acres covered with heavy

forests of mixed timber. Nearly all the wood will be cut for railroads and for charcoal used in manufacturing iron. It is estimated that the county yet contains over 1,000,000 M of good pine, besides a large amount of cedar. The timbered land in *Livingston* is estimated at 180,000 acres, averaging fifty cords per acre, and worth $1 per cord, standing. The timber is principally oak, with some ash, white-wood, bass-wood, and black walnut. *Manistee* has about 120,000 acres in hard-wood forests, yielding 50 cords per acre, and, where accessible to the water, worth $1 per cord, standing; and about 200,000 in pine, from which the timber has been extensively cut. The unculled portion will average 15 M per acre, worth, standing, $1 to $2 per M. The amount of pine yet standing is estimated at 800,000 M. *Menominee* estimates its standing pine at 600,000 M. The amount of hemlock-timber is large, and considerable cedar is shipped for ties and telegraph-poles. There is also a large area of hard-wood forests, principally of beech and maple, some of it yielding as high as 100 cords per acre. The price of timbered lands varies from $1.25 to $15 per acre. The forests of *Mason* are made up of alternate belts of pine and hard wood, mixed with hemlock. A portion of the pine-area yields over 30 M per acre. The value, on the stump, is $1 to $2 per M. The lumber is shipped to Chicago and Milwaukee. The only manufactories of wood are two bowl-mills and one sash and door factory. The average yield of the forests in *Bay* is 40 cords per acre, worth, standing, 50 cents per cord. *Jackson* reports 120,000 acres in forests, among which the oaks are prominent. There is a large amount of second-growth hickory and oak, for which the handle-factories pay an average of $12 per cord. Wood averages $5 per cord. Recently, 5 black-walnut trees were sold, standing, for $250 cash. The second growth, in twenty years from the time the original forest is cut, will yield more cords than that. The southern part of *Sheboygan* is covered with pine, hemlock, and cedar. On the higher lands, in the northern part, the hard-wood forests yield 200 to 300 cords per acre. It is estimated that 50,000 M of timber will be cut within the current year. The yield of pine-forests is 10 to 15 M per acre. There is a large export of cedar in shingles, posts, telegraph-poles, and timber for paving-blocks. *Emmett* is yet nearly covered with primitive forests of hard wood, with hemlock, yielding 50 cords per acre. *Charlevoix* is also all timbered; on the upland with hard woods, among which the sugar-maple holds the first rank, and on the lowlands with a dense growth of cedar, hemlock, pine, and balsam. The hard-wood forests average 50 cords per acre. About 25 per cent. of the land in *Barry* is in forest. A little more than half of this is oak-openings, yielding 30 cords per acre, a considerable portion of which is valuable for building. The estimated yield for the other portion is 8 M of timber and 60 cords of wood per acre. About 12½ per cent. of *Genesee* is left in forest of hard wood, yielding 50 cords per acre. *Clare* has about 7 townships of untouched pine-forests, some of which is considered the best in the State; and 3 townships in forests of pine and hemlock, mixed with hard woods. In *Lake*, 33 per cent. of the forest-area is covered with Norway and white pine, yielding 10 M per acre; 38 per cent. "with a stunted growth jack-pine," worthless for timber; and the other third, with hard wood, yielding 100 cords per acre. The timber-land in the northern part of *Oakland* consists of oak-openings, but the southern tier of townships has a large extent of heavy hard-wood forests, yielding 150 cords per acre. There are about 32,200 acres of this heavy forest, valued at $100 per acre; and about 72,500 acres of the oak-openings, yielding 25 cords, and valued at $40 per acre. The original forests in *Leelenaw* yet cover 75 per cent.

of its surface; 33 per cent. of the growth is sugar-maple, and the remainder a mixture of the usual kinds. The yield varies from 40 to 8 cords per acre. Large quantities of maple-sugar are made, and the average price, in the home-market, is 10 cents per pound. *Calhoun* is a hard-wood county, about half being oak-openings; the estimate for forests 168,000 acres, averaging 50 cords per acre, worth, standing, 80 cents per cord. For a single black-walnut tree the owner has been offered $200. The eastern part of *Macomb* is covered with mixed forests; the western, with oak-openings. The average yield is 50 cords. The forests in *Lenawee* are a mixture of hard wood; partly heavily timbered, and partly oak-openings. The uncleared land in the eastern part of *Muskegon* is covered with a heavy growth of valuable timber, but of little salable value, except in the vicinity of railroads. *Alpena* reports 300,000 acres in pine, yielding 5 M per acre, and valued at $10 per acre; 300,000 acres in mixed forests, valued at $2.50 per acre; and 95,683 acres in swamps and plains, burnt or cut over, valued at $1.25 per acre. A portion of the beech and maple forests yield 100 to 150 cords per acre; of the pine, 30 M per acre.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Alcona	974	75.3	Leelenaw	58,668	77.3
Allegan	106,201	48.3	Lenawee	128,986	32.2
Alpena	2,282	81.9	Livingston	73,095	22.8
Antrim	39,729	89.8	Mackinac	1,209	76.5
Barry	93,849	35.7	Macomb	93,303	35.5
Bay	15,865	44.2	Manistee	21,051	83.4
Benzie	48,305	70.9	Manitou	6,801	65.7
Berrien	95,223	39.2	Marquette	650	64.8
Branch	89,530	35.7	Mason	22,627	78.4
Calhoun	92,688	27.6	Mecosta	....	....
Cass	96,803	35.1	Menomonee	821	82.1
Charlevoix	25,013	90.2	Midland	13,686	68.6
Cheboygan	2,153	60.2	Monroe	100,499	41.8
Chippewa	6,510	60.4	Montcalm	82,525	61.7
Clare	963	68.7	Muskegon	59,782	74.1
Clinton	105,445	43.7	Newaygo	40,030	40.6
Delta	2,967	79.6	Oakland	137,480	27.8
Eaton	106,090	46.3	Oceana	42,386	76.0
Emmett	14,642	84.9	Ogemaw	144	51.4
Genesee	63,064	66.6	Ontonagon	30,534	79.8
Grand Traverse	132,446	42.8	Osceola	59,731	50.8
Gratiot	104,195	64.4	Oscola	370	71.1
Hillsdale	108,976	35.2	Ottawa	104,566	52.4
Houghton	6,377	55.6	Saginaw	81,020	63.5
Huron	114,009	78.4	Sanilac	103,017	68.8
Ingham	108,960	41.7	Shiawassee	96,835	44.2
Ionia	124,250	42.4	Saint Clair	82,803	33.7
Iosco	4,031	86.1	Saint Joseph	64,703	24.3
Isabella	42,999	69.3	Tuscola	109,623	56.4
Jackson	97,980	25.0	Van Buren	96,777	41.1
Kalamazoo	73,546	24.4	Washtenaw	108,550	25.7
Kalkaska	3,982	72.9	Wayne	83,574	29.0
Kent	150,893	39.8	Wexford	8,007	79.2
Kewanee	509	55.5			
Lake	2,735	79.1	Total	4,080,146	40.7
Lapeer	82,029	39.4			

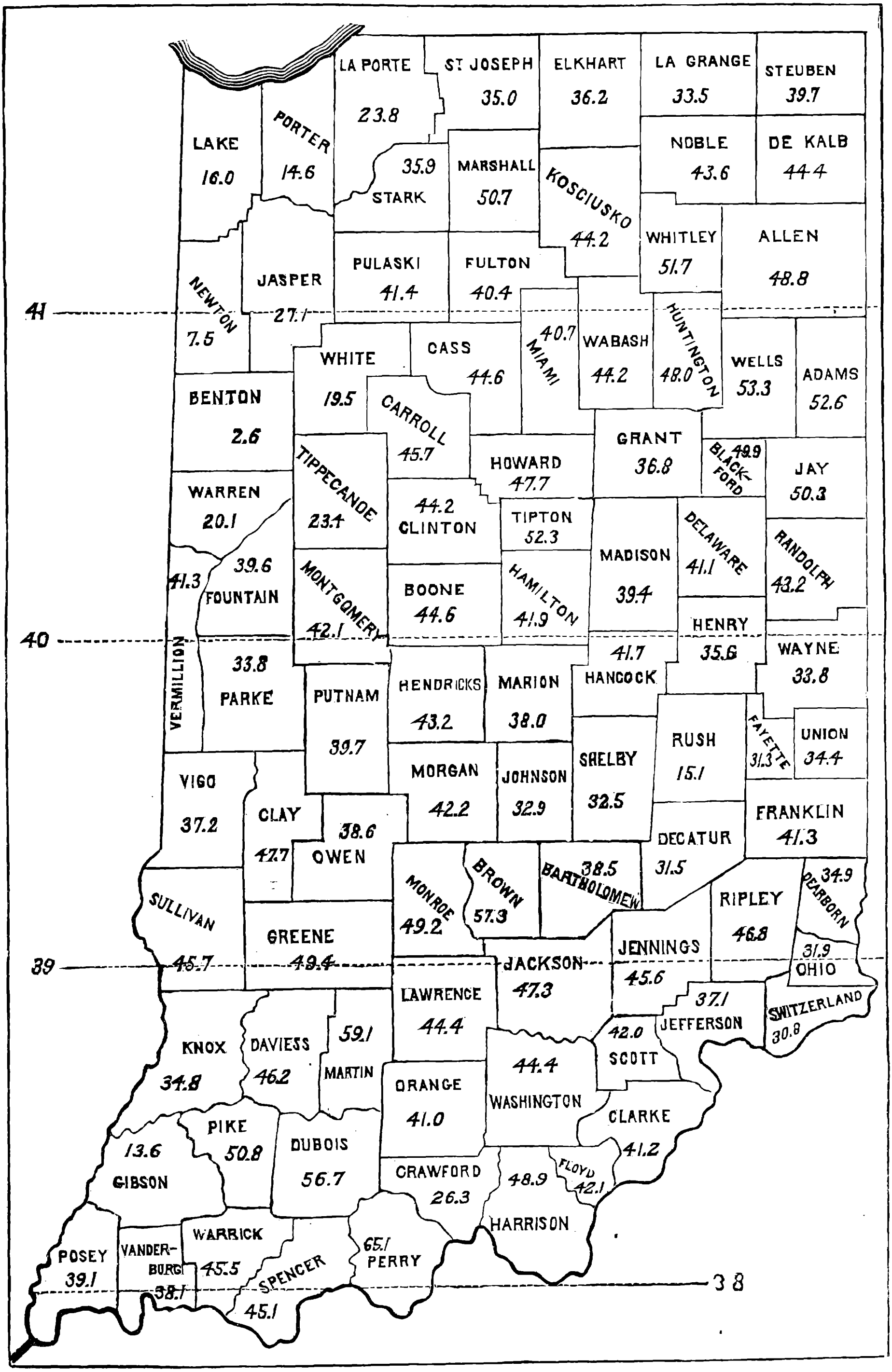
INDIANA.—Among the varieties prevailing throughout the State, the oaks, poplar, black walnut, hickory, ash, bass-wood, beech, and maple are prominent. Scarcely any pine or other conifer is produced. *Howard* still contains large quantities of valuable timber; the value of the standing forests are estimated at not less than $100 per acre, and in some localities $200 to $300. *Hamilton* is heavily timbered. Large quantities of black walnut have been shipped within a few years. Good walnut is worth $30 per M in the tree; poplar, ash, and oak, $5 to $6. Many walnut-trees are worth $50 to $75 each. Wood, in market, is not worth over $2.50. Many oak-staves are shipped. Over half of the land in *Perry* is yet covered with timber. From *Orange*, millions of feet



WISCONSIN AND MICHIGAN.

of yellow poplar, black walnut, and cherry are annually shipped. Many standing trees of black walnut sell for $30 to $50 each. The forests yield 60 to 80 cords per acre. Wood, in market, is worth $2 to $2.25 per cord. In many parts of *Lake* the second growth, now quite large, is much more dense, the trees taller, and the forest finer by far than the original growth. Since the prairie-fires have beeen checked, the growth is rapid; the amount of growing wood and timber now is greater than ever before, and still increasing. Wood, in the tree, is worth $1 per cord. In *Brown*, 67 per cent. of the land, or about 136,500 acres, is covered with forests. It claims the finest tracts of hickory and white-oak timber in the State, which can be bought at a less price per acre than land in cultivation. *Ripley* reports 114,000 acres of "lands very heavily timbered, and would average 25 cords of wood per acre." About 25 per cent. of *Tippecanoe* is timbered, much of it grown up since the annual fires were stopped. Owing to the cheapness of lumber from the North, these lands sell for an average of $40 per acre—less than prairie-lands. In *Posey*, not over one-third of the original timber remains, and the area is rapidly diminishing. Portable saw-mills have cut up vast amounts of black walnut and other timber. Rail-fences are being rapidly replaced with plank. *Clay* has about 120,000 acres in forests, magnificent in growth and kinds, averaging 75 cords per acre. Very little is consumed in fuel, coal being cheaper. Black walnuts 2 to 4 feet in diameter are worth $10 per M in the tree; white oak, abundant and of superior quality, 3 to 5⅓ cents per cubic foot; hickory, 5 cents per cubic foot. The value of woodland per acre ranges from $10 to $50. The estimated range of yield in the forests of *Knox* is very wide—50 to 500 cords per acre; in *Grant*, $25 per acre. Walnut-timber is worth $10 to $20 per M; poplar and oak, $5 to $10; wood, in the tree, 25 cents to $1 per cord. The forests in *De Kalb* average, per acre, 3 M of lumber, and 40 cords of wood. Standing wood is valued at 40 cents per cord, and timber $6 per M. The extent is 95,000 acres, worth $30 to $35 per acre. In *Whitley*, single walnut-trees often sell for $100. Walnut-lumber sells at $40 to $60 per M, (nearly all shipped East;) poplar, ash, and oak, at $12 to $20. After taking off the timber for lumber and rails, 50 to 75 cords of wood per acre are left; worth, at the railroad, $2.25 to $2.50. Timber is being used up very rapidly; in the winter of 1874–'75, over fifty thousand dollars' worth of walnut, in the log, was shipped via New York to Europe. In *Wabash*, half the forests are on bottom-lands, chiefly valuable for timber, and worth $25 to $50 per acre. The upland, more suitable for wood, yields 50 cords per acre, worth, in the tree, 80 cents per cord. *Crawford* has yet a large surplus of timber, especially oak and hickory. From the small growth of hickory, millions of hoops are shipped to the sugar-regions of the South, besides large quantities used in cooperage at home. The average price, delivered, is $10 per thousand. "Timber-land rates from $3 to $10 per acre, and in many instances the value of the timber on the land, if judiciously handled, would equal five times the cost." *Floyd* claims that its hickory is not excelled on the continent. A large establishment is working it up into handles and shafts, for which the demand exceeds the supply; large quantities are also shipped in spokes. From *Vanderburgh*, the once plentiful walnut and poplar have been well thinned out. On the outer margin of the bottoms of the Ohio River there are some swamps of cypress not yet invaded. "A remarkable feature of the forest-area of this county is the large amount of dense young growth, growing on uplands and bottoms, where twenty-five years ago the growth was sparse." In *Union*, the forests yield 35 cords per acre,

worth, in the tree, $1 per cord, and the land $45 per acre. The principal timber in *Putnam* was walnut, which has been mostly exported. *Morgan* reports 90,000 acres in forest, the most of it heavily timbered. The aggregate of valuable timber is estimated at $3,000,000, and the forests, exclusive of this, at $25 per acre. The average value per acre of forests in *Warren* is placed at $40. From the 25,000 acres of forests in *Switzerland*, the walnut will all disappear, it is believed, within ten years, unless the fashion in furniture changes. "Timber of all kinds is growing scarce, and even wood is so scarce and high that farmers haul coal from the Ohio River to their homes, ten or twelve miles in the interior, for use in cooking, &c. The portable saw-mills are fast cleaning the county of valuable timber." Two establishments for manufacturing furniture are already obliged to import a portion of their walnut, which commands $30 to $35 per M; other lumber, $16 to 20. About half the land in *Pike*, one of the heaviest-timbered counties in the State, is cleared. Thousands of cords of poplar, oak, and other woods are burned in log-heaps every year. More than two-thirds of *Carroll* was covered with a dense, heavy forest, the remainder being oak-openings. The forests now average 60 cords per acre, worth, standing, 50 cents per cord. *Jennings* reports 33 per cent. of the land in forests, which are decreasing annually. The oak is being worked up in staves, ties, and lumber; poplar is largely shipped in shingles and lumber. The forests in *Daviess* average 75 cords per acre. In *Rush*, the average value of timber-land is now greater than that of improved. Much of the forest is thinned out sufficiently for blue-grass. A heavy business is carried on in walnut-lumber. Many standing trees bring $100 per tree. Valuable timber is yet plenty. Half the area of *Martin* is still covered with forests, yielding 50 to 100 cords per acre, and not worth, standing, over 10 cents per cord. Large quantities of oak and hickory remain, but more than half the walnut and poplar is cut off. From *Washington*, great quantities of black walnut have been shipped within the last year; not more than 15 per cent. of the original growth is left; of poplar and ash, 20 per cent.; oak, 30; hickory, 50. Wood, in market, is $2 to $3 per cord. Half the land in *Stark* is timbered, but the greater part is scrubby, and not worth more than $10 per acre. There are 3,000 to 4,000 acres along the Yellow River, covered with a thrifty growth, worth $50 per acre. The forests in *Marion* are estimated to average 40 cords per acre, worth, standing, 75 cents per cord. The estimate for *Lawrence* is 145,000 acres in forest and wood-land pastures, on which the timber alone is worth $10 per acre. *Bartholomew* reports about 85,000 acres, on which timber is abundant, and likely to be for many years. *Shelby* has about 65,000 acres, on which the timber and wood are each worth an average of $12.50 per acre, or $25 for both. Large quantities of walnut, sawed and in logs, are being shipped East. Much valuable oak-timber is dying from some unknown cause. In *Madison*, forest-land is estimated to yield 100 cords, worth $25 per acre. *Steuben* has about 39,000 acres in forest. The most valuable timber is black walnut, some standing trees of which are worth $100 each. Within five years large quantities have been shipped, at prices ranging from $30 to $50 per M. Whitewood and white ash have been largely shipped, at $15 to $20 per M. A stave-factory at the county-seat is working up elm and red oak—worthless before its establishment. The best forests are found, by trial, to yield 100 cords of wood per acre, exclusive of timber. In *Gibson*, portable saw-mills and the ax are making large inroads in the forests; yield, 50 to 100 cords. Black-walnut trees, standing, sell at $10 to $40 per tree. Poplars are 4 to 7 feet in diameter. In *Johnson*,


LA PORTE 23.8
ST JOSEPH 35.0
ELKHART 36.2
LA GRANGE 33.5
STEUBEN 39.7
LAKE 16.0
PORTER 14.6
STARK 35.9
MARSHALL 50.7
KOSCIUSKO 44.2
NOBLE 43.6
DE KALB 44.4
WHITLEY 51.7
ALLEN 48.8
NEWTON 7.5
JASPER 27.1
PULASKI 41.4
FULTON 40.4
41
WHITE 19.5
CASS 44.6
MIAMI 40.7
WABASH 44.2
HUNTINGTON 48.0
WELLS 53.3
ADAMS 52.6
BENTON 2.6
CARROLL 45.7
HOWARD 47.7
GRANT 36.8
BLACKFORD 49.9
JAY 50.3
WARREN 20.1
TIPPECANOE 23.4
CLINTON 44.2
TIPTON 52.3
MADISON 39.4
DELAWARE 41.1
RANDOLPH 43.2
FOUNTAIN 39.6
41.3
MONTGOMERY 42.1
BOONE 44.6
HAMILTON 41.9
HENRY 35.6
WAYNE 33.8
40
VERMILLION
PARKE 33.8
PUTNAM 39.7
HENDRICKS 43.2
MARION 38.0
HANCOCK 41.7
RUSH 15.1
FAYETTE 31.3
UNION 34.4
SHELBY 32.5
VIGO 37.2
CLAY 42.7
OWEN 38.6
MORGAN 42.2
JOHNSON 32.9
DECATUR 31.5
FRANKLIN 41.3
SULLIVAN 45.7
GREENE 49.4
MONROE 49.2
BROWN 57.3
BARTHOLOMEW 38.5
JACKSON 47.3
JENNINGS 45.6
RIPLEY 46.8
DEARBORN 34.9
OHIO 31.9
39
SWITZERLAND 30.8
LAWRENCE 44.4
JEFFERSON 37.1
KNOX 34.8
DAVIESS 46.2
MARTIN 59.1
SCOTT 42.0
WASHINGTON 44.4
ORANGE 41.0
CLARKE 41.2
PIKE 50.8
GIBSON 13.6
DUBOIS 56.7
CRAWFORD 26.3
HARRISON 48.9
FLOYD 42.1
POSEY 39.1
VANDERBURG 38.1
WARRICK 45.5
SPENCER 45.1
PERRY 65.1
38

INDIANA.

the unculled forests yield 60 cords per acre, worth, for timber and wood, an average of $1 per cord. *Scott* reports at least half of its area covered with a heavy growth of timber, which is now being manufactured into lumber and staves, the former worth $15 per M and the latter $17 per M. Within the last ten years nearly all the walnut has been shipped from *Hendricks*, and the oak-forests have been much reduced by the manufacture of ties and staves. But little more than half the land has been entirely cleared of timber, and the thinned forests are estimated to yet average, per acre, timber worth $15 to $20, and 30 cords of wood worth 50 cents per cord. The best walnut is worth $30 to $50 per tree; white oak, $15 to $20 per tree. In *Franklin*, the finest walnut sells at $50 to $75 per tree. Walnut-lumber for shipment to eastern markets sells at the mills at $25 to $40 per M. About 20 per cent. of the land is in forest, but not more than 5 per cent. of the original valuable timber remains. Poplar and walnut trees are dying. A few are cultivating groves of locust for fence-posts, under a common opinion of farmers that it pays better to cultivate the land and buy timber. The remaining forests are disappearing very rapidly. In *Harrison*, portable saw-mills, stave-machines, and shingle-mills are using up the timber fast, and at the present rate it will soon be exhausted. About 33 per cent. of the land in *Decatur* is still in forest. The beech-forests are estimated to yield 150 cords per acre, worth, standing, $1.50 per cord. Ash and black-walnut lumber, at the county-seat, are worth $20 per M. Poplar is worth $15 to $25 per standing-tree. The average value of the timbered lands is $100 per acre. About 25 per cent. of the land in *Tipton* is in forests, the average value of which is $60 per acre, while that of improved land is $30. The pine shipped from Michigan into *Noble* equals all the lumber of different kinds exported. Coal is cheaper than wood for fuel. *Fayette* reports about 50,000 acres in forest, but from a great portion the valuable timber is much culled. Timber for buildings and fences is becoming scarce. Timbered land is valued at $100 to $200 per acre, and that having much walnut at a higher rate.

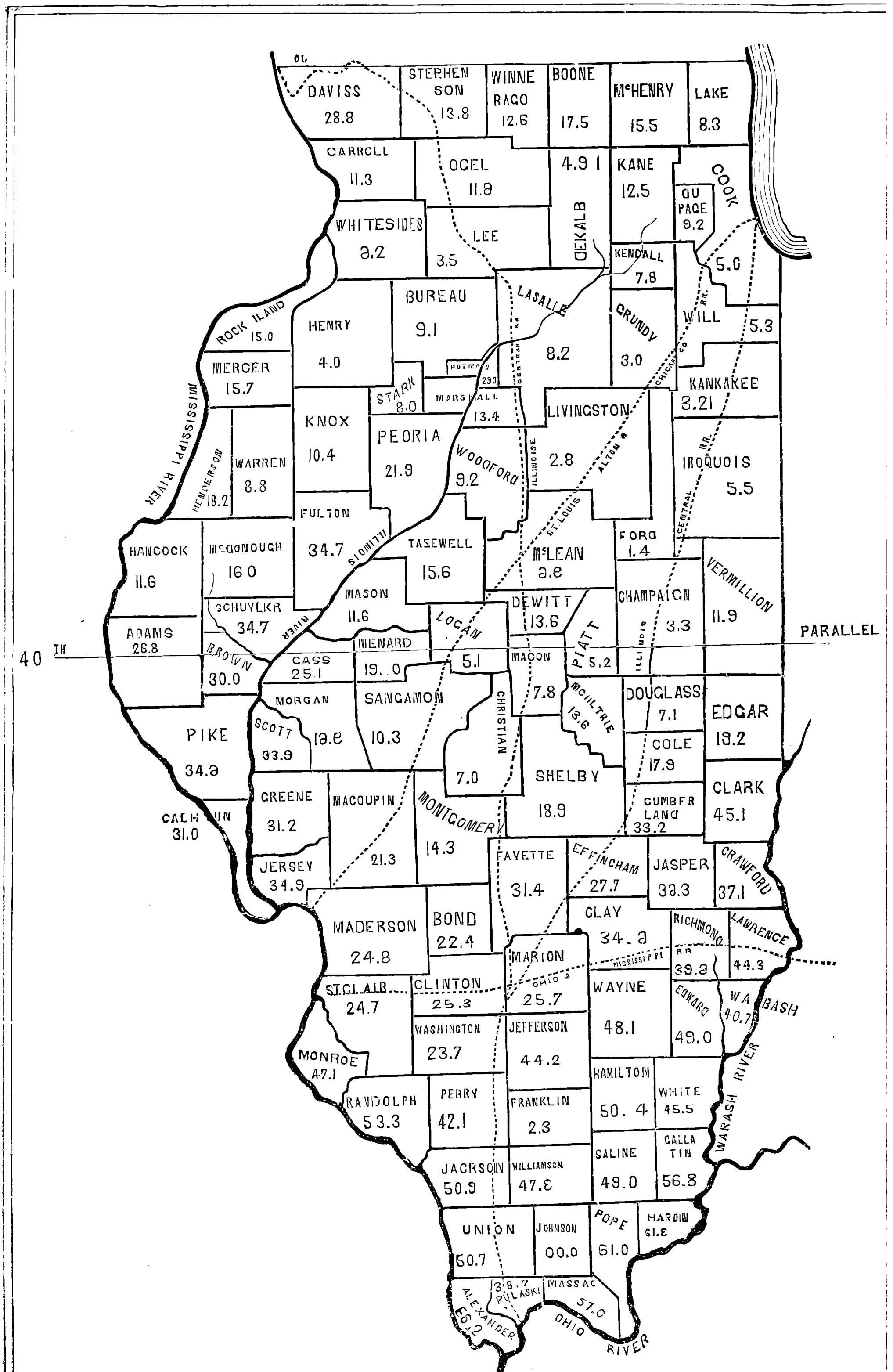
Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adams	84, 400	52. 6	Henry	85, 013	35. 6
Allen	158, 916	48. 8	Howard	59, 858	47. 7
Bartholomew	82, 997	38. 5	Huntington	98, 884	48. 0
Benton	4, 297	2. 6	Jackson	119, 955	47. 3
Blackford	34, 699	49. 9	Jasper	35, 343	27. 1
Boone	103, 080	44. 6	Jay	98, 423	50. 3
Brown	56, 694	57. 3	Jefferson	83, 214	37. 1
Carroll	83, 296	45. 7	Jennings	87, 985	45. 6
Cass	73, 461	44. 6	Johnson	61, 809	32. 9
Clarke	76, 084	41. 2	Knox	83, 779	34. 8
Clay	84, 225	47. 7	Kosciusko	122, 962	44. 2
Clinton	119, 420	44. 2	La Grange	70, 000	33. 5
Crawford	44, 607	26. 3	Lake	28, 279	16. 0
Daviess	96, 756	46. 2	La Porte	64, 105	23. 8
Dearborn	61, 408	34. 9	Lawrence	109, 850	44. 4
Decatur	72, 788	31. 5	Madison	87, 321	39. 5
De Kalb	95, 497	44. 4	Marion	86, 276	38. 0
Delaware	94, 652	41. 1	Marshall	109, 593	50. 7
Dubois	97, 090	56. 7	Martin	93, 702	59. 1
Elkhart	88, 651	36. 2	Miami	78, 960	40. 7
Fayette	39, 256	31. 3	Monroe	102, 869	49. 2
Floyd	34, 829	42. 1	Montgomery	126, 711	42. 1
Fountain	77, 763	39. 6	Morgan	97, 612	42. 2
Franklin	99, 903	41. 3	Newton	8, 167	7. 5
Fulton	65, 621	40. 4	Noble	96, 400	43. 6
Gibson	27, 085	13. 6	Ohio	17, 760	31. 9
Grant	86, 270	36. 8	Orange	94, 891	41. 0
Greene	125, 882	49. 4	Owen	90, 906	38. 6
Hamilton	93, 369	41. 9	Parke	87, 227	33. 8
Hancock	71, 509	41. 7	Perry	103, 889	65. 1
Harrison	136, 065	48. 9	Pike	87, 545	50. 8
Hendricks	104, 841	43. 2	Porter	27, 402	14. 0

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Posey	75,000	39.1	Tipton	52,819	52.3
Pulaski	56,908	41.4	Union	31,097	34.4
Putnam	110,428	30.7	Vanderburgh	41,424	38.1
Randolph	116,726	43.2	Vermillion	62,065	41.3
Ripley	114,608	46.8	Vigo	80,459	37.2
Rush	37,740	15.1	Wabash	97,013	44.2
Scott	40,789	42.0	Warren	35,369	20.1
Shelby	72,622	32.5	Warrick	89,743	45.5
Spencer	87,749	45.1	Washington	133,527	44.4
Starke	15,882	35.9	Wayne	82,326	33.8
Steuben	63,274	39.7	Wells	99,783	53.3
Saint Joseph	80,177	35.0	White	33,641	19.5
Sullivan	102,896	45.7	Whitley	92,470	51.7
Switzerland	39,197	30.8			
Tippecanoe	61,290	23.4	Total	7,189,334	39.6

Illinois.—The forests in Illinois are similar to those in Indiana in kinds of timber, being almost exclusively deciduous. *Stephenson* is mostly prairie, with some oak groves and barrens. The latter have a young growth of oak, hickory, walnut, etc. About half the land in *Randolph* is in forests of mixed timber, held at $15 to $25 per acre, while improved lands are sold at $25 to $60 per acre. In *Peoria,* 14 to 15 per cent. of the area is in forest. "In many localities the large trees are a good deal cut off, but the young growth, now from 5 to 15 inches in diameter, is very thick and abundant." Timber-forests sell at $25 to $100 per acre. There is still some fine walnut for shipping. A part of the 154,000 acres of forest in *Clark* is young growth, but a large portion is on bottoms, heavily timbered, many trees being 5 to 6 feet in diameter. Three-fourths of the timber is oak. Lumbermen who worked up the forest on about 1,000 acres report an average per acre of 10½ M of lumber and 75 cords of wood. Another lot, on which the growth was only about forty years old, yielded per acre 4,000 rails and 40 cords of wood. About 20 per cent. of the area in *Jasper* is timbered, estimated to yield 5,000 rails and 150 cords of wood per acre. Large quantities of black walnut are being exported. Wherever the fires on prairies have been stopped a few years, a young, spontaneous growth covers the ground. *Pike* reports 25 per cent. of the area covered with forests, from which the best timber has been generally cut. The young timber which has grown up since the fires have been kept out is much better in quality than the old. In *Edwards*, 25 per cent. of the area is in forests. The yield is 20 to 30 cords per acre, and the value of the land, away from towns, $10 to $12 per acre. Many forest-trees have been killed by caterpillars within two years. The estimate for forests in *Menard* is 60,000 acres, of which nearly 14,000 are sufficiently thinned for pasturage. The unculled forests yield 75 cords per acre. A lot of 400 acres of forest-land, bought at between $26 and $27 per acre, yielded at that rate, and the wood netted $1.87 per cord. In addition to the wood, were 25 ties per acre, which sold for 50 cents per tie. Black walnut is more easily grown than any other native timber. The opening of many coal-shafts has occasioned a falling off in the price of wood. *Henry* is a prairie county, with only belts of timber along streams. In *Wayne*, forest-land sells at $5 to $15 per acre, and standing wood is worth about 10 cents per cord; ash-lumber, $12 to $20 per M. Great quantities of ties are manufactured, and considerable lumber for manufacturing purposes is shipped. *Alexander* is heavily timbered, the forests averaging 100 cords per acre, or 25 M in lumber. Standing wood is worth 25 cents per cord. The forests in *Warren* yield 25 cords per acre, worth, in the tree, $1 per cord. Oak and hickory are the principal kinds, the black walnut, etc., having been cut off. Only one-third of *Sangamon* was

originally timbered, and upon this considerable encroachment has been made. Some forest-planting has been done, but not enough to counterbalance the consumption. *Livingston* has no forests. *Rock Island* reports about 10,000 acres, on which the timber is worth $150 per acre; *Whitesides*, 20,000 acres, averaging 20 cords per acre, and valued at $30 per acre. "Many groves of soft maple, Lombardy poplar, black walnut, and butternut have been planted on the prairies, and cultivated with excellent success, affording to the planter shelter as well as profit." *De Kalb* reports about 18,000 acres in forest, giving an average of 8 acres to each farm. Its principal value is for fuel. "There are probably more acres in forest-land than twenty years ago." In *Fayette*, the bottoms of the Kaskaskia, two to four miles broad on each side, are heavily timbered. Within fifteen years vast quantities of ties and cord-wood have been shipped. About half the county-area is forest. The forests in *Tazewell* average 70 cords per acre, one-eighth of which is timber; oak-plank, at the mills, are worth $25 per M.; rails, $40 per M. The forest-area is gradually diminishing, being converted into tillage and pasture. *Ford* estimates only 1 per cent. of the land in forest, the heaviest of which is worth $150 per acre. Fence-posts are worth 15 cents each; wood, $5 to $7 per cord. On the prairie-soil, black walnut will grow more surely and faster than any other kind that has been tried. In *Woodford*, about 14 per cent. of the land is timbered, principally with oak. The price of wood is $4 to $6 per cord, and the value of forest-land, $40 to $60 per acre. *Piatt* has about 25,000 acres in forest, yielding 25 to 30 cords per acre, and valued at $40 per acre. Within thirty-five years, the forest-area has been considerably enlarged. Besides hundreds of acres of spontaneous growth, now 8 to 15 inches in diameter, and 50 to 60 feet in height, considerable groves of walnut and soft maple have been planted. One-fourth of the area in *Marion* is in forest, averaging 20 cords per acre, and the standing timber worth $4 per acre. In *Macoupin*, for the last five years, forest-growth has been increasing, owing to the fact that the discovery of coal along the railroad-lines has prevented the companies from purchasing wood. Among the timbers is osage orange. In *Moultrie*, "timber-land is being cleared for farms, and timber is being destroyed with alarming rapidity." In *Stark*, timber-lands are not so high as a few years ago, while prairie-lands are much higher; the latter range from $75 to $100 per acre; the former, $60 to $70. The decline is owing to the importation of lumber. *Boone* has very little forest of old growth. Wood, delivered, is $5 to $6 per cord. Throughout the prairie portion of the county a considerable amount of soft maple has been planted for ornament and wind-breaks. Locust was extensively planted by the early settlers, but it has mostly disappeared, having been killed by borers eight or ten years ago. *Richland* reports about 72,000 acres in forest, and among the usual varieties of trees the crab-apple is specified. *Mason* is a prairie county, having very little timber of any kind. In *Brown*, 75 per cent. of the land was originally timbered, chiefly with oak. Large quantities are manufactured into ties, staves, lumber, and cord-wood. In *Shelby*, the white oak is sawed into lumber and shipped to Saint Louis; the black walnut is shipped in great logs to the Eastern States and to England. The estimated average yield per acre, for the forests, is 500 rails and 30 cords of wood. *Logan* has 31,000 acres in forest, averaging 75 cords per acre, worth $3 per cord. Walnut-lumber is shipped to Chicago and the eastern market. While prairie-lands have gone up from $10 to $50 per acre, timber-lands have gone down from $50 to $25 and $30. The reasons are, coal at $2.50 per ton, and the substitution of hedges for fence-timber. *Ogle*, being mostly prairie,

the timber is found only in small patches along the streams, constituting only about 1 per cent. of the area. Small groves of soft maple, planted a few years ago, are quite thrifty. Cottonwood, Lombardy poplar, and golden willow, planted around dwellings and orchards for wind-breaks, grow very rapidly. Yellow locusts have been planted, but have not proved successful, owing to the borer. In *White*, 60 per cent. of the land is yet in forest, and the old-time "log-rolling," in the way of piling up timber and burning it on the land, is still in practice. About 7 per cent. of *Cook* is timbered at the rate of 50 cords per acre—mostly used for fuel, pine from Michigan being used in fencing. It is estimated that the annual growth of forests in *Morgan* will not supply more than 25 per cent. of the lumber and fuel needed for home consumption. Only 3 per cent. of *Grundy* was originally timbered. Most of that is cut off, but a thrifty growth of young timber is succeeding. The estimate for *Hancock* is 25 per cent. of the area in forests, yielding 19½ cords per acre, worth, in the tree, $1.85 per cord. Nearly all the timber in *Carroll* has grown within the last twenty-five years. The average yield is placed at 5 cords per acre. *Johnson* has 33 per cent. of its land in forests, including several thousand acres of cypress. Four saw-mills are busy in working the oak into lumber of various kinds, which is being shipped to different markets. The average yield of forests in *Putnam* is 20 cords per acre. On uncultivated prairie, since fires have been kept out, a crop of timber has grown up worth $25 to $30 per acre. It is estimated that the quantity of timber in the county exceeds that when it was first settled. While *Fulton* has less than one-eighth of the forest-growth in valuable timber it had thirty years ago, it has as much in wood now as it had then. The fine growth on the bottoms of the Illinois River, well thinned out in the days of the steamboats, have been rapidly growing up again since the introduction of railroads. *Bureau* reports only 4 per cent. of the land in forest. Some have planted timber. Black walnut does well, and grows fast. Black locust has been tried and abandoned, owing to the borer. Wood, in the tree, is worth $3 per cord; lumber, $20 to $50 per M., according to kind and quality; forest-land, $30 to $200 per acre. *Vermillion* reports one-eighth the area in forest, valued at $40 to $50 per acre. Large quantities of black walnut are shipped east. Pine can be imported as cheap as lumber from the forests can be manufactured. Fences are now largely hedge of osage orange. *Saint Clair* has no valuable forests. Cord-wood is worth no more than it costs to cut and haul it, owing to the abundance of coal in the county. *Pulaski*, originally covered with a very heavy growth, is still the theater of extensive lumber business. The soil and climate are so favorable that a new growth contends vigorously with the rapid destruction of the old by the lumbermen. In *Clinton*, 30 per cent. of the land is covered with forests, the average value of which, standing, is $15 per acre. *Schuyler* reports 92,000 acres in forests, equal in value to any in the State. Half the land in *Jackson* is in forest, yielding 10 to 20 M per acre, worth $12 to $18 per M. In *McLean*, eight townships have no forest, except groves that have been planted, and others have but little. The 25,000 acres of forest in *Lee* range from mere underbrush to timber of fair size, averaging about 5 cords per acre. In *McHenry*, lumber for building and fencing is chiefly pine imported from Michigan and Wisconsin. The moderate supply of forest for fuel is well distributed, and after the first crop is removed the growth of the second is rapid. Seasoned wood is worth $5 per cord. The forests in *Adams* yield 20 to 30 cords per acre, and are valued at $20 to $50 per acre. In *Mercer*, it is estimated that, with the present area in forests, the annual growth will equal the consumption.



FOREST AREA OF ILLINOIS.

Coal is so cheap that there is but little market for wood, and hedges are found to be the most economical fences. The forests in *Hamilton* were "quite thrifty until the extreme drought of 1872 and 1873, with the vast number of worms in those years, caused thousands of acres to die." A dense young growth had sprung up on the uncultivated prairie since the fires had been stopped, but during the last three years the leaves have been all stripped off by the middle of June, and most have died. A like destruction has been caused to large tracts of timber on the bottom-lands.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adams	112, 576	26. 8	Livingston	12, 462	2. 8
Alexander	17, 761	56. 2	Logan	17, 394	5. 1
Bond	42, 613	22. 4	Macon	18, 153	7. 8
Boone	29, 886	17. 5	Macoupin	81, 224	21. 3
Brown	35, 491	30. 0	Madison	89, 459	24. 8
Bureau	41, 866	9. 1	Marion	61, 579	25. 7
Calhoun	63, 443	61. 0	Marshall	28, 260	14. 3
Carroll	29, 793	11. 9	Mason	31, 739	11. 6
Cass	33, 493	25. 1	Massac	33, 396	57. 0
Champaign	16, 780	3. 3	McDonough	52, 547	16. 0
Christian	19, 803	7. 0	McHenry	53, 293	15. 5
Clark	102, 201	45. 1	McLean	40, 366	6. 9
Clay	80, 612	34. 6	Menard	34, 931	19. 0
Clinton	48, 868	23. 5	Mercer	45, 977	15. 7
Coles	45, 214	17. 6	Monroe	83, 369	47. 1
Cook	19, 635	5. 0	Montgomery	47, 804	14. 3
Crawford	78, 350	37. 1	Morgan	60, 217	16. 9
Cumberland	40, 234	33. 2	Moultrie	24, 783	13. 6
De Kalb	17, 722	4. 9	Ogle	43, 643	11. 6
De Witt	29, 548	13. 6	Peoria	48, 666	21. 9
Douglas	11, 897	7. 1	Perry	68, 470	42. 1
Du Page	17, 243	9. 2	Piatt	5, 978	5. 2
Edgar	66, 803	19. 2	Pike	128, 953	34. 6
Edwards	57, 585	49. 0	Pope	87, 754	61. 0
Effingham	56, 330	27. 7	Pulaski	12, 516	39. 2
Fayette	93, 460	31. 4	Putnam	17, 184	29. 3
Ford	2, 996	1. 4	Randolph	162, 274	53. 3
Franklin	3, 994	2. 3	Richland	50, 618	39. 6
Fulton	123, 823	34. 7	Rock Island	31, 239	15. 0
Gallatin	68, 750	56. 8	Saline	70, 393	49. 0
Greene	93, 242	31. 2	Sangamon	51, 085	10. 3
Grundy	6, 256	3. 0	Schuyler	62, 477	34. 7
Hamilton	93, 878	50. 4	Scott	44, 633	33. 9
Hancock	43, 385	11. 6	Shelby	74, 908	18. 9
Hardin	44, 771	61. 3	Stark	12, 375	8. 0
Henderson	34, 705	18. 2	Saint Clair	76, 591	24. 7
Henry	12, 620	4. 0	Stephenson	43, 167	13. 8
Iroquis	22, 478	5. 5	Tazewell	45, 268	15. 6
Jackson	87, 642	50. 9	Union	83, 606	50. 7
Jasper	67, 023	39. 3	Vermillion	53, 078	11. 9
Jefferson	94, 888	44. 2	Wabash	37, 558	40. 7
Jersey	51, 427	34. 9	Warren	27, 294	8. 8
Jo Daviess	82, 076	28. 8	Washington	55, 852	23. 7
Johnson	3	....	Wayne	146, 794	48. 1
Kane	34, 646	12. 5	White	78, 167	45. 5
Kankakee	10, 978	3. 2	Whitesides	21, 823	6. 2
Kendall	14, 244	7. 8	Will	24, 261	5. 3
Knox	41, 566	10. 4	Williamson	116, 949	47. 3
Lake	21, 072	8. 3	Winnebago	37, 238	12. 6
La Salle	48, 117	8. 2	Woodford	25, 217	9. 2
Lawrence	72, 738	44. 3			
Lee	12, 071	3. 5	Total	5, 061, 578	19. 6

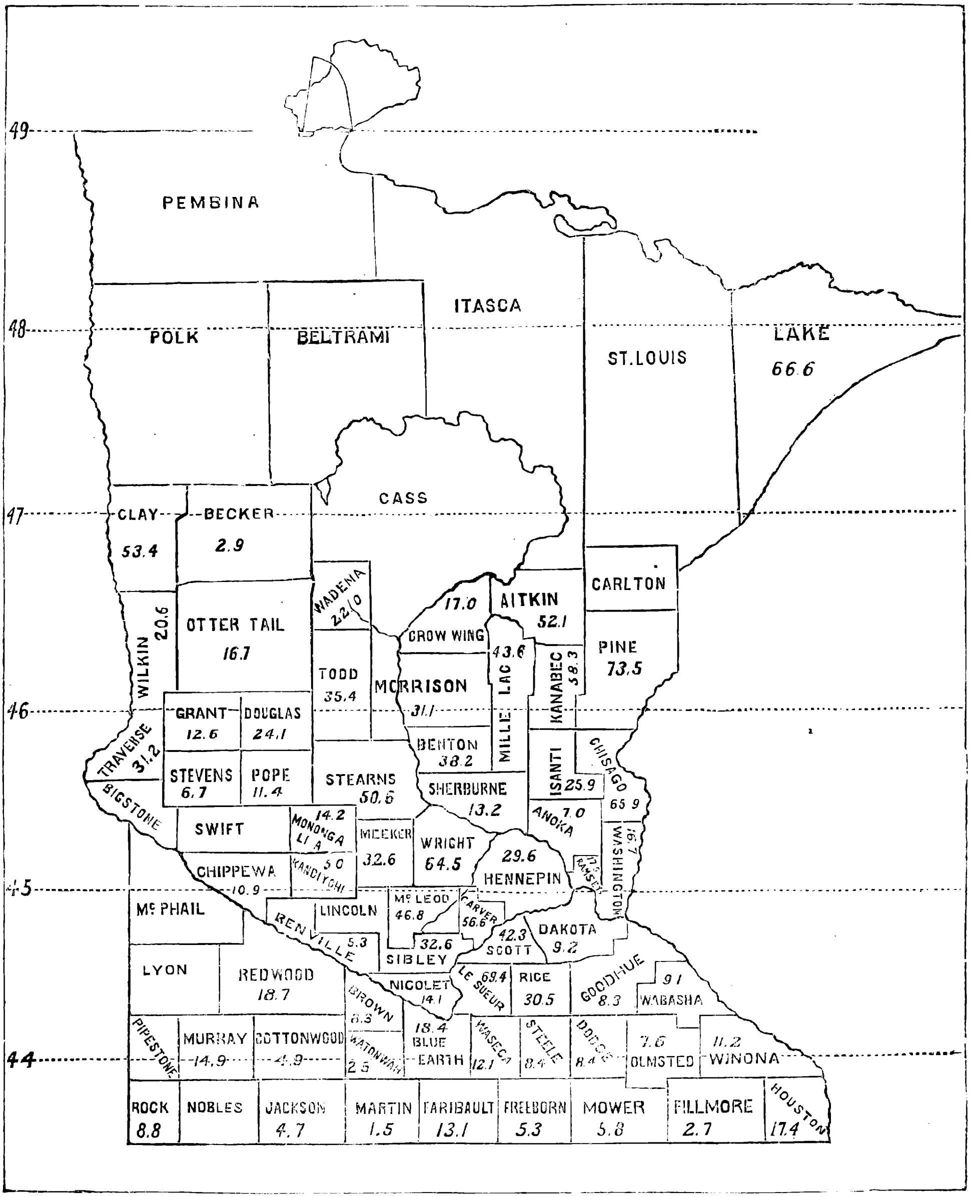
WISCONSIN.—The deciduous trees in Wisconsin correspond to those in Indiana and Illinois, except that there is much less of black walnut and more of bass-wood. Forests of pine, or partly of pine, are extensive, and hemlock, cedar, and tamarack are found in considerable quantities. A noticeable feature is the extent to which land originally occupied with scrubby oaks, known as oak-openings, is being covered with a dense and thrifty spontaneous growth of hard-wood timber of different kinds. *Brown* reports 200,000 acres in forest, containing an aggregate of 150,000 M of pine, and 150,000 M of white oak, besides 30 cords of wood per acre. *Waukesha*, twenty-four miles square, has left only woodland enough for domestic use. *Outagamie* is a hard-wood county, in which the forests average 35 cords per acre. Wood, in the cord, sells

for $2. No present market for timber. In *Chippewa*, some of the hard-wood forests yield 150 cords per acre; some of the pine, 60 to 80 M per acre. It is estimated that during the past winter 400,000 M of timber were put into the Chippewa River and its tributaries. One-third of the land in *Monroe* is in forest; in the southeast portion, hard wood, valued at $10 per acre; in the northeast, white and Norway pine, and tamarack, with oak, valued at the same rate. One-third of *Green* is also in forests of hard wood, much of it being second growth. Average price of corded wood, on the ground, $2; in market, $3 to $5. Rails, on the ground where made, $40 to $50 per thousand. The price of timber-land ranges from $10 to $50 per acre. Considerable oak-timber is manufactured in the county, particularly into wagons, of which about 2,500 are made annually. The forests in *La Fayette* are principally of oaks. Some of the most valuable are worth $50 per acre for the timber alone. Standing wood is worth $1 per cord. "Timber is rapidly increasing in quantity, its growth being much in advance of its consumption, and consequently less valuable than formerly." *Douglas* is covered with mixed forests, including pine, spruce, and tamarack. The valuable pine-lands command $10 per acre. About half of *Saint Croix* is timbered; more than half the growth is of oaks; 10 per cent. pine, of which 75 per cent. has been cut. In *Kewaunee*, the fires of 1871 destroyed 70,000 acres, leaving about 90,000 of good, hard-wood forest, with some hemlock and cedar, averaging 30 cords per acre. The county also contains about 20,000 M of pine. Lumber finds a ready market at Chicago and Milwaukee, at remunerative prices. *Trempealeau* is mostly prairie and bluffs, with some hard-wood timber on the northern slopes and the streams, where the fires have not run. The new forests on the slopes are growing much faster than the consumption of the old growth. The wood-market of Milwaukee has greatly depleted the heavy forests of *Ozaukee*. For the last six or eight years, the price for the best quality has averaged $8 per cord. White-oak logs bring, at the mills, $12 per M; white ash, $16. Of the 16 townships in *Jefferson*, 7 were covered with deciduous forests, averaging 50 cords per acre, of which about 12,000 acres remain. The other 9 were white-oak and scrub-oak openings. The forests in *Oconto* are partly of pine and partly deciduous. In *Fond du Lac*, 12½ per cent. of the land remains in hard-wood forests, with some cedar and tamarack, yielding 75 cords per acre. Openings, on which, twenty-five years ago, there were only bushes 5 to 6 feet high, now yield 20 cords peracre. *Richland* has a large forest-area, yielding 100 cords per acre. Bass-wood lumber is worth $15 per M; oak, $16; wood, in market, $2.50. The forests left in *Dodge* are confined to small lots on the farms for home use. Wood, on the stump, is worth $2 to $3.50 per cord. Great quantities of forest-products have been converted into coal for smelting iron in the county. Much of the land from which this timber was early cut off is now covered with a thick growth of young hard-woods, yielding 20 cords per acre. In *Sheboygan*, there are no forests remaining, except the few acres which almost every farmer has reserved for home use. In *Adams*, the forest-growth is partly of white and Norway pine and tamarack. One-third of the area of *Juneau* is covered with forest, of which pine and white-oak timber constitute 25 per cent. of the value. The average yield of wood is 10 cords per acre, worth $2.25 per cord. *Shawano* reports 700,000 acres of timbered land. The pine-forests yield 10 M per acre; the hard wood, of which there are 100,000 acres, 2 M, or 20 cords of wood, per acre. *Door* originally had about 20,000 acres in pine and 50,000 in white cedar, the remainder of the county being covered with deciduous woods. By the fires of 1871 about 50,000 acres of forest were destroyed, and only about

12,000 acres were left. About 12,000 cords of beech and maple wood and 10,000 M of pine-lumber are shipped annually. The timbered land in *Green Lake* is principally openings, yielding 10 cords per acre, worth, in market, $2.50 per cord. Second growth is allowed, to some extent, to take the place of the first, which is being rapidly removed. In *Clark*, the pine-forests, covering 40 per cent. of the area, are being rapidly consumed. They are valued at about $25 per acre. The hard-wood forests, occupying 50 per cent. of the land, average 75 cords per acre. Bird's-eye maple is one of the timbers. *Columbia* was originally half prairie and half oak-openings, on which the trees were short and few. Wood is worth $1.50 per cord, in the tree; fence-posts, $5 per hundred. There are now about 5,000 acres of second growth, very dense and thrifty, and promising to be far superior to the original timber. About 10 per cent. of the land in *Sauk* is timbered, and 15 per cent. more is covered with a young growth. One firm in the county manufactures timber for 20,000 wagons annually. At the time of settlement, every acre in *Washington* was heavily timbered. About 25 per cent. is now covered with deciduous forests, with tamarack and cedar. In *Rock*, most of the original growth has been consumed; about 10 per cent. of the area is covered with a second growth of black oak, much of which is now valuable. Wood, in market, averages about $6 per cord. *Vernon* has oak-openings, with fine hard-wood forests in the eastern part. Wood, sold to steamboats on the Mississippi, brings $2 to $2.75. The forests in *Calumet* are of hard woods, producing 20 to 30 cords per acre, worth, in market, $2 to $2.50. In the northern part are some swamps of cedar and tamarack. *Portage* had pine forests in the northern part, from which most of the valuable timber has been cut. The ridge west of the Wisconsin River is very heavily timbered with hard woods. *Lincoln* has an area of five hundred and seventy-five square miles, and nearly half is still timbered. The larger portion is white oak of excellent quality. Among the other kinds are black walnut and cherry. Walnut and burr-oak logs, rafted to Saint Louis, are worth $30 to $40 per M; other lumber, at the mill, $17.50 per M. Railroad-ties are delivered at 30 cents per tie. In *Pepin*, "the land is being rapidly cleared of all timber by new settlers."

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adams	92,603	60.3	Manitowoc	86,395	29.9
Ashland	....	....	Marathon	52,879	81.2
Barron	2,246	61.4	Marquette	97,008	51.3
Bayfield	....	....	Milwaukee	27,011	22.6
Brown	98,302	64.7	Monroe	87,783	33.7
Buffalo	37,407	17.4	Oconto	22,525	69.8
Burnett	9,643	89.2	Outagamie	107,861	57.5
Calumet	88,424	58.0	Ozaukee	46,259	34.7
Chippewa	28,834	30.5	Pepin	56,255	57.0
Clark	45,234	80.8	Pierce	57,160	41.0
Columbia	73,703	17.4	Polk	37,151	60.7
Crawford	125,289	66.9	Portage	29,764	16.7
Dane	145,972	21.2	Racine	14,753	7.6
Dodge	82,345	16.2	Richland	129,527	58.0
Door	36,399	76.0	Rock	66,424	16.0
Douglas	694	74.7	Sauk	124,872	38.0
Dunn	46,780	29.4	Shawano	18,901	46.6
Eau Claire	3,456	3.7	Sheboygan	113,655	39.5
Fond du Lac	89,635	21.4	Saint Croix	25,197	12.7
Grant	166,847	29.5	Trempealeau	20,677	9.5
Greene	80,483	23.7	Vernon	91,785	29.4
Green Lake	43,090	23.1	Walworth	62,111	19.1
Iowa	94,324	22.7	Washington	91,788	36.7
Jackson	23,144	19.3	Waukesha	75,619	23.5
Jefferson	59,837	18.8	Waupaca	89,108	47.3
Juneau	58,706	40.6	Waushara	35,560	20.1
Kenosha	16,160	10.0	Winnebago	53,749	22.6
Kewaunee	76,572	68.6	Wood	11,234	38.8
La Cross	36,333	19.2			
La Fayette	41,969	13.1	Total	3,437,442	29.3

MINNESOTA has comparatively little pine or other conifer, but bass-wood has a prominent place in the forest-growth. Returns indicate a wide-spread interest in the planting of forest-trees, which is assuming organized efficiency. They also show an extensive and increasing spontaneous growth of valuable and thrifty timber-trees of different kinds on uncultivated prairies protected from fires. *Freeborn* reports about 15,000 acres in forests, including the planted groves. In *Morrison*, the forest-area is in pine, in tamarack-swamps, and in oak and maple. The pine-timber is being taken off rapidly. A large amount of good timber-land is yet open to settlement under the homestead law. The best of the hard-wood land sells for not over $2.50 per acre. *Rock* has only a little strip of forest along Rock River, worth $75 to $85 per acre. Wood, $5 to $7 per cord. "The timber-culture act has done much to stimulate the planting of forests, and in ten years there will be more timber in this county than at present." In *Stearns* fully half the area is timbered with deciduous varieties, yielding 75 cords per acre, worth $1 per cord. "As soon as the prairies are protected from fire, groves of timber spring up, and every farmer is cultivating groves around his building." In *Scott*, one-third of the forest-growth is bass-wood. The average price of wood is $2.75 per cord. *Pope* reports 25 per cent. of the area timbered, yielding 100 cords per acre. The remainder of the county is prairie, with scattered openings, on which a young growth is springing up. Forest-land is held at $10 to $25 per acre. *Fillmore* has more forest-products than 20 years ago. Many acres, once burnt over annually, are now covered with a thick young growth. The average yield is 20 cords, and the value $15 to $25 per acre. In *Martin*, "thousands of acres of young timber-trees are growing, some spontaneous, and others planted." In *Jackson*, "quite an interest has been taken in the cultivation of timber on the prairie-farms, and there are some very fine groves of cotton-wood, soft maple, and other varieties." *Redwood* has 7,000 to 8,000 acres in forests, yielding 120 cords per acre; choice lots 12 M of lumber logs and 45 cords per acre. "The cultivation of forests on the prairies will amount to from 1 to 20 acres per quarter section." *Blue Earth* produces more of elm than of any other kind. Some black-walnut groves yield 18 M per acre, worth $40 per M. Wood is worth $2 to $5 per cord. Of *Meeker*, 33 per cent. is timbered, though being cut off rapidly; the remainder is prairie, with small, scattered groves, affording considerable wood. The best timbered land in *Renville* yields 40 cords, worth, in the tree, $30 per acre. *Olmsted* reports 64,000 acres in forest, averaging 25 cords per acre, worth, in the tree, $1 per cord. The price of timbered land varies from $10 to $75. *Chippewa* is a prairie county, having only about 5,000 acres of woodland in the river valleys, which sells at $35 to $50, and yields 25 to 30 cords per acre. Of the 365,000 acres of land in *Stevens* only 400 are timbered, three-fourths of the wood being oak. *Winona* has only scattered patches of oak on the bluffs along the Mississippi. Wood is $4 to $6 per cord. Where running fires have been prevented, "fine groves of oak are springing up." *Lyon* has only about 2,000 acres in native forest, yielding 25 cords, and valued at $25 per acre. *Nicollet* reports 10 per cent. of the land in forest, varying in value from $10 to $50 per acre. "Farmers plant more or less trees every year around their dwellings, on line fences, and along the roads." In *Isanti*, two or three townships are good forest-land, the remainder being prairie, with oak-openings. A large extent of forest along the railroad is being converted into cord-wood. The forest lands in *Steele* average about 20 cords per acre, worth, in the tree, $2 per cord. Some attention has been given to planting forest-trees, and the interest is on the increase, as the experi-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NOBLES
JACKSON
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HOUSTON
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MINNESOTA.

ments have been quite successful. Many small groves of quick-growing varieties have been planted near dwellings. While the black walnut has been very successful, the chestnut has completely failed. In *Todd*, 67 per cent. of the land is timbered. *Mercer* is a prairie county, having not over 2,000 acres of timber, in scattered patches, worth $25 to $40 per acre. *Watonwan*, out of 276,480 acres, has only about 300 in native forest. There are about 1,000 acres planted and under cultivation in groves ranging from 1 to 12 acres, mostly of cottonwood, ash, soft maple, and black walnut; with proper treatment, all these varieties do well. The Government survey of *Nobles* showed but 40 acres in forest. There were but few settlers previous to 1872, but now there are several hundred acres of planted forests, chiefly cottonwood and soft maple. A county forestry association has been organized, and the children in each school-district are being organized into centennial bands of little foresters, with promises of "badges and more valuable prizes for planting trees." *Douglas* reports 120,000 acres in forest, in which maple and white oak are the leading kinds. *Sherburne* is mostly prairie, with scattered oak-openings, but "has a good supply of tamarack-swamps and some heavy timber." *McLeod* was originally half covered with forests, only 25 per cent. of which remain, and these are being destroyed very fast. Wood, near market, is worth $1.25 to $2; farther back, it has no market-value. About 15 per cent. of the land in *Brown* is timbered at the rate of 40 cords, and valued at $30 to $40 per acre. Wood is worth $3 to $4 per cord; oak-lumber, $30 per M.

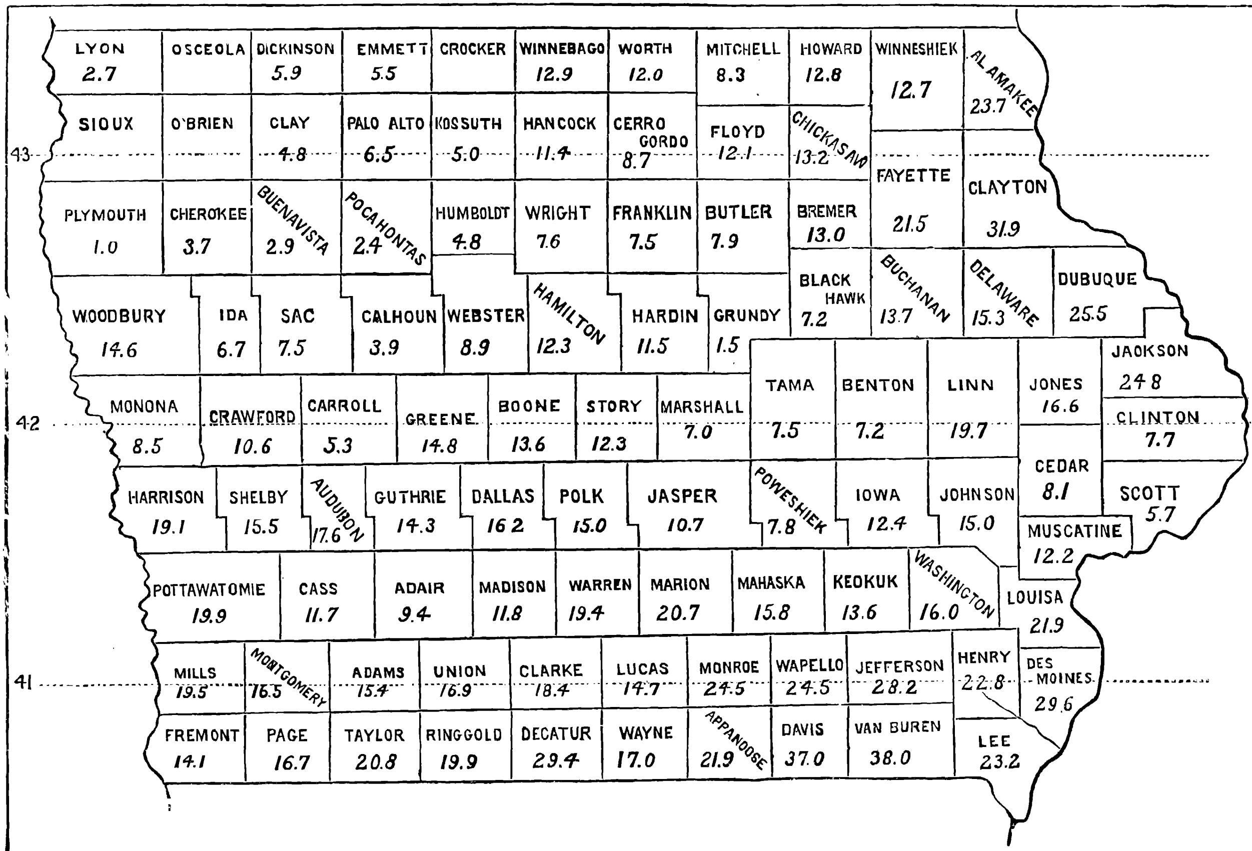
Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Aitkin	160	52.1	Mille Lacs	6,298	43.6
Anoka	3,205	7.0	Monongalia	12,039	14.2
Becker	30	2.9	Morrison	5,364	31.1
Benton	3,747	38.2	Mower	9,429	5.8
Big Stone	....	....	Murray	359	14.9
Blue Earth	51,397	18.4	Nicollet	18,936	14.1
Brown	11,512	8.3	Olmstead	25,612	7.6
Carver	95,241	56.6	Otter Tail	5,436	16.7
Cass	....	....	Pine	125	73.5
Chippewa	1,431	10.9	Pope	10,638	11.4
Chisago	28,073	65.9	Ramsey	4,210	17.5
Clay	454	53.4	Redwood	875	18.7
Cottonwood	315	4.9	Renville	3,990	5.3
Crow Wing	115	17.0	Rice	63,303	30.5
Dakota	24,129	9.2	Rock	273	8.8
Dodge	12,729	8.4	Scott	64,932	42.3
Douglas	27,005	24.1	Sherburne	6,516	13.2
Faribault	52,366	13.1	Sibley	49,485	32.6
Fillmore	6,610	2.7	Stearns	172,866	50.6
Freeborn	12,067	5.3	Steele	10,017	8.4
Goodhue	29,194	8.3	Stevens	484	6.7
Grant	1,384	12.6	Todd	11,203	35.4
Hennepin	59,093	29.6	Traverse	100	31.2
Houston	27,992	17.4	Wabasha	25,133	9.1
Isanti	13,116	25.9	Wadena	30	22.0
Jackson	1,569	4.7	Waseca	17,727	12.1
Kanabec	70	58.3	Washington	17,595	16.7
Kandiyohi	1,604	5.0	Watonwan	1,359	2.5
Lac-qui-Parle	....	....	Wilkin	1,868	20.6
Lake	422	66.6	Winona	31,657	41.2
Le Sueur	122,169	69.4	Wright	65,419	64.5
Martin	1,736	1.5			
McLeod	64,656	48.8	Total	1,336,299	20.6
Meeker	39,349	32.6			

IOWA.—In this State, the forests are almost exclusively deciduous. Conifers are scarcely noticed in any county. Among the important kinds generally diffused are the different varieties of oak, walnut, and hickory, soft maple, bass-wood, and cottonwood. The other kinds of deciduous trees common to the latitude prevail more or less, according

to locality. It will be seen in the condensed reports below that a very successful beginning and considerable progress have been made in cultivating forests and hedges. Besides scattered groves on the uplands, *Monona* has on the bottoms of the Missouri and its tributaries about 48,000 acres very heavily timbered, chiefly with yellow cottonwood, elm, ash, mulberry, walnut, etc. Lumber is abundant at $10 per M. Timber-land, at $10 to $25 per acre, is not increasing in value. A large portion of the farmers are cultivating timber, mostly of cottonwood, walnut, ash, and maple. Some have 30 to 40 acres planted, and many plant-belts around each quarter section. *Tama* has about 8 per cent. in native timber, half of which is oak. The imported pine is now cheaper than the native lumber. Wood is $3 to $6 per cord. The range of value for timbered land is from $5 to $100, and the average about $30. It is estimated that there are fully 50,000 acres planted and under cultivation in the county. The principal kinds are maple, cottonwood, and white willow, planted at an average of 8 feet apart. Timber of all kinds grows with great thrift. In *Polk*, according to Government survey, 40 per cent., or 147,736 acres of the land, is timbered. Since the fires have been stopped a thrifty young growth has been coming on. The average yield of the old forests is 50 cords per acre; of the young, 25. Corded wood is worth, on the ground, $2.50 to $4.50 per cord; lumber, at the mills, $20 to $40 per M. *Hancock* has only about 2,000 acres in forest, yielding 10 cords per acre. *Cerro Gordo* has 30,000 acres of land lightly timbered, averaging 15 cords per acre. Standing wood is worth $2 to $3 per cord; in market, $4 to $6; fence-posts, 12 to 20 cents each. *Humboldt* has only about 2,600 acres in forest. The best timbered land sells at $60 to $75 per acre. *Pocahontas* also has but a few hundred acres of short timber along the streams. *Ida* has about 950 acres, chiefly soft maple and box-elder, yielding 150 cords per acre. Wood is $4 per cord. *Fayette* reports 38,539 acres in natural forests, portions of which consist of a thick young growth. The average value of timber-land is $25 per acre, and the yield varies from 20 to 200 cords per acre. The estimate for forests in *Johnson* is 50,000 acres, valued at $50 per acre. Average price of wood in market, $5.50; soft wood, at brick and lime kilns, $4.50. In *Adair*, 10 per cent. of the area is in forest, and the value of timber-land, $25 per acre. *Benton* has about 6,000 acres in forest, located on the borders of streams, and worth $50 per acre. Successful efforts are being made at cultivating timber. All kinds tried do well, except black locust, which the borer kills. *Dubuque* reports only about 9,000 acres, averaging 25 cords per acre. Wood, delivered, is worth $5 to $6. About one-twelfth the area of *Bremer* was timbered originally, a considerable portion of which has been cleared for cultivation. Wood, in the tree, is worth $3 to $5 per cord; in market, $6 to $9; timber-land, $30 to $90 per acre. In *Washington*, much of the original growth skirting the water-courses has been cleared away. Wood, in market, is $7 per cord. From cuttings of Lombardy poplar, set out on 30 square rods ten years ago, 10 cords of wood were recently cut. Our correspondent, within ten years, has planted successfully 20 acres, 18 being soft maple, elm, ash, and walnut, and 2 conifers. As the result of trial, he strongly recommends Scotch and Austrian pine. In *Louisa*, 25 per cent. of the land is in timber, averaging 25 cords per acre, worth, in the tree, $1.50 per cord. Black walnut, the most valuable timber, sells for $50 per M. *Marion* has about 49,000 acres in natural forests, varying in yield from 10 to 60 cords, and in value from $10 to $50 per acre. Wood is worth $2 to $4 per cord. *Clay*, at the time of settlement, had

very little timbered land. "A very large area has been planted to timber; the kinds are mostly soft maple, box-elder, cottonwood, ash, and willow." According to Government survey, *Mitchell* had 20,000 acres in forest, over half of which has been consumed. "The amount of timber planted is very small, compared with the consumption." *Lucas* reports 10 per cent. of the land in forest, yielding over 150 cords per acre. Wood, delivered, $4 per cord. The estimate for *Cass* is 3,000 acres, yielding 15 cords per acre. About 6 per cent. of the land in *Howard* was originally forest, most of which has been cut off, but young groves of black oak and poplar have sprung up, so that there is now nearly or quite as much timber in the county as ever. Small groves of cottonwood, Lombardy poplar, and locust have been planted, but the locust has proved an entire failure. About 20 per cent. of the land in *Fremont* is timbered. On the upland the timber is mostly of young growth, grown up since the fires have been kept out. Timber-land sells at $25 to $50 per acre. *Pottawattamie* has a few small tracts, skirting the streams, which are well timbered. The best wood commands more per cord than coal per ton. Large quantities of trees, 3 to 8 inches in diameter, are being cut for wood, and "the prospect is that there will be a timber-famine before many years." *Wayne* has "a good supply of timber on all the streams." *Muscatine* has 32,053 acres in natural forests, yielding 30 cords per acre, worth, in the tree, $1 to $2 per cord. It also reports 1,050 acres in planted forests. *Decatur* is reported as "one of the best-timbered counties in the State." Timbered land is valued at $10 to $20 per acre; wood is worth $2 to $3 per cord. Second-growth walnuts and oaks of twenty-one years are 12 inches in diameter at the base and 6 inches 20 feet up; soft timbers, twice as large. *Hardin* has 20,530 acres in native, and 961 acres in planted forests; those on the bottoms, in which black and white walnut are prominent, are the heaviest, yielding 30 to 50 cords, and worth, standing, $40 to $75 per acre; those on the uplands are valued at $20 to $35 per acre. Wood is $3 to $4 per cord. Our correspondent planted, ten years ago, one acre in trees, half white willow and half cottonwood. The trees were 8 feet apart each way. Finding they were too thick, last season he cut out every other tree. The product was 13 cords of wood, worth $4 per cord. The expense was 75 cents per cord. This would give for the whole a net profit of $84.50 on an acre of poor soil for ten years. *Harrison* has, along the Missouri, a strip about three miles wide covered with a dense growth, very tall, the timber of which, largely cottonwood, is estimated at $250 per acre. It has also, in the eastern part, several groves, in the aggregate 2,900 acres, equally valuable. *Clinton* reports 22,912 acres of natural and 422 of planted timber. The indigenous is mostly second growth, yielding 25 cords per acre. Timber grows very rapidly. *Jackson* reports a tract of forest along the Maquoketa averaging eight miles by forty, or over 200,000 acres, claimed to be the best body of timber in the State. Considerable black walnut, sold at $40 to $60 per M, is shipped to Boston, and some to London, England. Wood is $2 to $2.50 per cord. A belt one to two miles wide, along the Coon River, running through the county diagonally, is the principal timbered land in *Greene*. Owing to the rapid settlement of the county, this was being consumed very fast, but the recent development of coal has checked the consumption. The best yields 40 to 60 cords per acre. Wood is $3 to $4. *Black Hawk* is reported as "bountifully supplied with timber." Wood sells at $3 to $5. About 15 per cent., or 44,000 acres, of the land in *Delaware* is timbered; average price per acre, $20; yield, 20 cords; price of wood in market, $5 per cord. The forests in *Appanoose*, covering 5 per cent. of the area,

abound in white and burr oak of the best quality; held at $10 to $25 per acre. Timber is not used for fences, "as the osage-orange is planted very successfully for hedging," and coal, underlying the county, is used for fuel. *Jefferson* has about 55,000 acres in forest, being one-third of the area. Since the settlement of the county timber has increased very rapidly. Timber-land worth about $25 per acre. *Allamakee* reports 61,956 acres in natural and 326 in planted forests. Timbered land sells at $15 to $25 per acre. In *Crawford*, timbered land averages only 1 acre to 45 acres of prairie. "Large numbers of the more thrify farmers have planted groves of maple, cottonwood, black walnut, and box-elder, which have grown with great rapidity, and the vast expanse of treeless prairies, which a few years ago stretched in every direction as far as the eye could see, is now dotted over with beautiful groves which greatly add to the wealth of the county." Except a narrow belt along Rock River, *Sioux* was prairie, entirely treeless. The first settlement was in 1870, since which the settlers have been planting forest-trees. *Shelby* has only a few groves of 10 to 100 acres, scattered along the streams, except one grove of 5,000 acres in the northwest. Including all grades, from bush-land up, *Jones* has about 60,000 acres in natural forest, valued at $5 to $50 per acre. There are, in addition, scattered all over the county, planted groves of white maple, of 1 to 5 acres, and from one to ten years old. *Franklin* is mostly prairie. Fence-posts are principally imported, and coal used for fuel. Most of the farmers are planting groves around their dwellings; chiefly, soft maple, cottonwood, and white willow, with some black walnut, and butternut. Locust and Lombardy poplar have been tried, but have not done well; the borers kill the former, and the latter will not thrive in groves. For *Woodbury*, the State census of 1875 returned 7,304 acres in natural forests, 500 acres in planted timber, and 6,650 rods of hedge. *Calhoun* has not more than 3,000 or 4,000 acres in forest, and that not heavy. About 8 per cent. of the land in *Dallas* is forest, bordering the streams. The best oak-timber is worth $50 per acre. Coal is largely used for fuel, and 75 per cent. of the lumber for fencing is imported pine. *Crow Wing* reports 67 per cent. of the land as timbered, "but a great portion of it nearly worthless—very scrubby;" yet, in some parts, jack-pine will turn out 150 cords per acre. In *Cherokee*, the best natural forests, not thinned, only yield 10 to 15 cords per acre. Wood is $4 to $5 per cord, but coal is chiefly used. "A great many are planting timber, which grows fast." *Plymouth* has only a few acres of natural forest, along the streams. The township of Lemars, when settled, seven years ago, had not a tree. It now has 190 acres of planted forests, principally cottonwood, maple, and box-elder, and fifteen miles of willow-hedge; all "with the most satisfactory results." Our correspondent, six years ago, planted 4 acres in cottonwood, on which the trees "are now worth $60 per acre for fencing, and (being cut) would grow up again for another crop. Some of the trees measure 9 inches in diameter. The cost per acre of raising, over and above the value of the two crops of corn raised on the same ground, was $5, leaving a profit of $55 per acre for the six years—making it the best paying crop for the farmer." *Iowa* has about 30,000 acres of "what is called timber-land, some of it pretty good, but the larger part thinned out. There is quite an amount of young timber." Fence-posts are 10 to 20 cents each; rails, $10 per hundred; wood, $2 to $5 per cord. *Boone* reports "76,800 acres of splendid timber," worth, exclusive of the land, $50 per acre. Native coal is being extensively worked. Cord-wood, on the ground where cut, is worth $2 to $3 per cord.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MITCHELL 8.3
HOWARD 12.8
WINNESHIEK 12.7
ALAMAKEE 23.7
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CLAY 4.8
PALO ALTO 6.5
KOSSUTH 5.0
HANCOCK 11.4
CERRO GORDO 8.7
FLOYD 12.1
CHICKASAW 13.2
FAYETTE 21.5
CLAYTON 31.9
PLYMOUTH 1.0
CHEROKEE 3.7
BUENAVISTA 2.9
POCAHONTAS 2.4
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WRIGHT 7.6
FRANKLIN 7.5
BUTLER 7.9
BREMER 13.0
BLACK HAWK 7.2
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DUBUQUE 25.5
WOODBURY 14.6
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GRUNDY 1.5
TAMA 7.5
BENTON 7.2
LINN 19.7
JONES 16.6
JACKSON 24.8
CLINTON 7.7
MONONA 8.5
CRAWFORD 10.6
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GREENE 14.8
BOONE 13.6
STORY 12.3
MARSHALL 7.0
CEDAR 8.1
SCOTT 5.7
HARRISON 19.1
SHELBY 15.5
AUDUBON 17.6
GUTHRIE 14.3
DALLAS 16.2
POLK 15.0
JASPER 10.7
POWESHIEK 7.8
IOWA 12.4
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MUSCATINE 12.2
POTTAWATOMIE 19.9
CASS 11.7
ADAIR 9.4
MADISON 11.8
WARREN 19.4
MARION 20.7
MAHASKA 15.8
KEOKUK 13.6
WASHINGTON 16.0
LOUISA 21.9
MILLS 19.5
MONTGOMERY 16.5
ADAMS 15.4
UNION 16.9
CLARKE 18.4
LUCAS 14.7
MONROE 24.5
WAPELLO 24.5
JEFFERSON 28.2
HENRY 22.8
DES MOINES 29.6
FREMONT 14.1
PAGE 16.7
TAYLOR 20.8
RINGGOLD 19.9
DECATUR 29.4
WAYNE 17.0
APPANOOSE 21.9
DAVIS 37.0
VAN BUREN 38.0
LEE 23.2

IOWA.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adair	8,529	9.4	Jefferson	69,429	28.2
Adams	10,392	15.4	Johnson	47,925	15.0
Allamakee	61,107	23.7	Jones	48,007	16.6
Appanoose	63,340	21.9	Keokuk	42,688	13.6
Audubon	4,132	17.6	Kossuth	2,319	5.0
Benton	23,558	7.2	Lee	60,596	23.2
Black Hawk	19,875	7.2	Linn	64,078	19.7
Boone	22,067	13.6	Louisa	48,111	21.9
Bremer	24,899	13.0	Lucas	27,206	14.7
Buchanan	33,553	13.7	Lyon	230	2.7
Buena Vista	799	2.9	Madison	23,687	11.8
Butler	12,228	7.9	Mahaska	44,124	15.8
Calhoun	765	3.9	Marion	57,586	20.7
Carroll	2,680	5.3	Marshall	16,771	7.0
Cass	4,442	11.7	Mills	29,584	19.5
Cedar	23,706	8.1	Mitchell	10,084	8.3
Cerro Gordo	5,872	8.7	Monona	8,972	8.5
Cherokee	1,377	3.7	Monroe	49,213	24.5
Chickasaw	22,125	13.2	Montgomery	11,656	16.5
Clarke	24,251	18.4	Muscatine	31,285	12.2
Clay	1,368	4.8	O'Brien	....	....
Clayton	117,213	31.9	Page	25,188	16.7
Clinton	30,710	7.7	Palo Alto	1,646	6.5
Crawford	5,010	10.6	Plymouth	365	1.0
Dallas	23,855	16.2	Pocahontas	951	2.4
Davis	99,625	37.0	Polk	34,218	15.0
Decatur	45,620	29.4	Pottawattamie	20,681	19.9
Delaware	44,163	15.3	Poweshiek	18,379	7.8
Des Moines	65,991	29.6	Ringgold	21,387	19.9
Dickinson	1,845	5.9	Sac	2,916	7.5
Dubuque	81,185	25.5	Scott	14,835	5.7
Emmett	1,976	5.5	Shelby	6,184	15.5
Fayette	47,875	21.5	Sioux	....	....
Floyd	20,238	12.1	Story	9,468	12.3
Franklin	7,621	7.5	Tama	20,283	7.5
Fremont	23,368	14.1	Taylor	22,873	20.8
Greene	10,708	14.8	Union	11,330	16.9
Grundy	2,718	1.5	Van Buren	85,189	38.0
Guthrie	15,128	14.3	Wapello	51,734	24.5
Hamilton	10,376	12.3	Warren	47,719	19.4
Hancock	2,173	11.4	Washington	41,762	16.0
Hardin	20,530	11.5	Wayne	27,509	17.0
Harrison	29,930	19.1	Webster	8,967	8.9
Henry	57,191	22.8	Winnebago	2,190	12.9
Howard	13,142	12.8	Winneshiek	44,360	12.7
Humboldt	2,476	4.8	Woodbury	6,005	14.6
Ida	591	6.7	Worth	6,475	12.0
Iowa	29,081	12.4	Wright	3,793	7.6
Jackson	80,285	24.8			
Jasper	33,146	10.7	Total	2,524,793	16.2

MISSOURI.—The forests in this State include all varieties, deciduous and coniferous, known to the latitude and climate. The most prevalent and valuable kinds of timber are pine, cypress, cottonwood, oaks, black walnut, and hickory. In the portions of the State that were originally prairie-land or openings, spontaneous and thrifty forests have sprung up and increased as increasing settlements have prevented annual prairie fires. It is reported that the thrift of this young growth is such, in some instances, as to annually add 1 to 1½ inches to the diameter of trees. In many localities, mining-industries make a ready home-market for forest-products, as well as for all products of farming and horticulture. Mechanical industries, outside of Saint Louis, are quite limited, but are gaining a foothold. In *Macon*, factories for plows and wagons afford a market for its oak-timber. In considerable portions of the State, original forests, heavily timbered with a variety of kinds of great intrinsic value, have in them large fortunes in abeyance, awaiting the advent of such industries. About 67 per cent. of the land in *Benton* is timbered; worth, on uplands, $3 to $8 per acre; bottoms, $5 to $12. The heaviest yield 100 to 300 cords per acre. On the bottoms, white and black walnut, and water-oak, are of great size and very valuable. In *Reynolds*, timber hardly pays the expenses of hauling. *Barton* is comparatively destitute of forests. *Schuyler* is about half covered with forests, in which

white oak is the most prominent and valuable timber. Railroad-ties are shipped in large quantities to Iowa and Nebraska. Lumber, at the mills, is worth $10 per M. *Butler* is heavily timbered, the northern half, with the finest yellow pine; in the valleys, among other kinds, with yellow poplar and black walnut. Cypress abounds on the overflowed lands. *Maries* is reported as "mostly timber-land," but the timber is without value, owing to its being so far from market. In *Knox*, about 20 per cent. of the land is timbered, valued at $10 per acre. About 50 per cent. of the area in *Moniteau* is covered with forest, half of which is black oak, and one-fourth post and white oak. The average value, including the land, is $10 per acre, and the yield, 30 cords. Though *Polk* is poorly timbered as yet, it has "a large area covered with a spontaneous growth of young oak," which has sprung up as a consequence of stopping prairie-fires. *Pemiscot* is reported as covered with heavy forests, in which the most valuable timbers are black walnut and cypress, large quantities of which are shipped, both in lumber and in logs, to Saint Louis, New Orleans, and other markets. The yield is 60 to 100 cords per acre. From 75 to 80 per cent. of the area in *Greene* is forest or brush land. "Nearly all the old timber is inferior, for the reason that the woodlands produce abundant grass, which is burned over every season, and injures the trunks of the trees." Forests from which the fires are kept are very thrifty, many of the trees adding one inch to their diameter annually. Old settlers agree in estimating the quantity of timber in the county 20 per cent. greater than it was thirty years ago. *Randolph* reports large quantities of walnut-lumber shipped at good prices, but the white oak is the most profitable. About 20 per cent. of the land in *Worth* is timbered, of which 40 per cent. is a very dense young growth, 3 to 18 inches in diameter, tall and straight. In *Jefferson*, thousands of acres are being cleared of forests annually in making charcoal and for cultivation. In *Dallas*, the quantity of timber is so much in excess of the demand that it has little value. *Hickory* has about 95,000 acres in forest, valued at $3 to $10 per acre. About 33 per cent. of the area in *Grundy*, being 112,000 acres, is in forest. Oak-rails are worth $3 per hundred; ties, $30; oak-lumber, $15 per M; cottonwood, $10; walnut, $25 to $30. *Platte* is heavily timbered. Black walnut sells readily in plank at $35 and $40 per M. Half the timber-land of *Jasper*, covering about 12½ per cent. of the area, has been consumed. Coal, to a great extent, is now used for fuel. Wood, delivered, sells from $2.50 to $3 per cord. *Saint Charles* has nearly half in forest, averaging 25 cords per acre. In clearing, the less valuable timber is burnt. All upland is covered with black-jack and hickory. *Ozark* lumber, at the mills, is worth $5 to $7.50 per M. Forests in *Washington* average 20 cords per acre. Much of the wood is furnished to lead and iron furnaces at 40 cents per cord in the tree. Within the last ten years the larger portions of the heavy pine-forests of the western and southwestern parts of the county have been cut off; but the land is now covered with a thrifty growth of young pine. Forests of red cedar, cut off twenty years ago, have been succeeded by a growth yielding from 15 to 20 cords per acre. In *Saint Genevieve*, the uplands, ten or twelve miles back from the river, are covered principally with white and black oak, varying in quantity from 10 to 15 cords per acre, worth $3 per cord in market. The most elevated lands are covered with yellow pine. About 20 per cent. of the area of *Macon* is well timbered with oak, supplying a plow-factory and a wagon-factory within the county. *Wright* has 320,000 acres in forest-area, yielding 10 cords per acre, selling at $1.25 in the cord. The uplands of *Buchanan* yield 100 cords per acre. The bottoms have a heavy growth of cottonwood. Two-thirds of the area

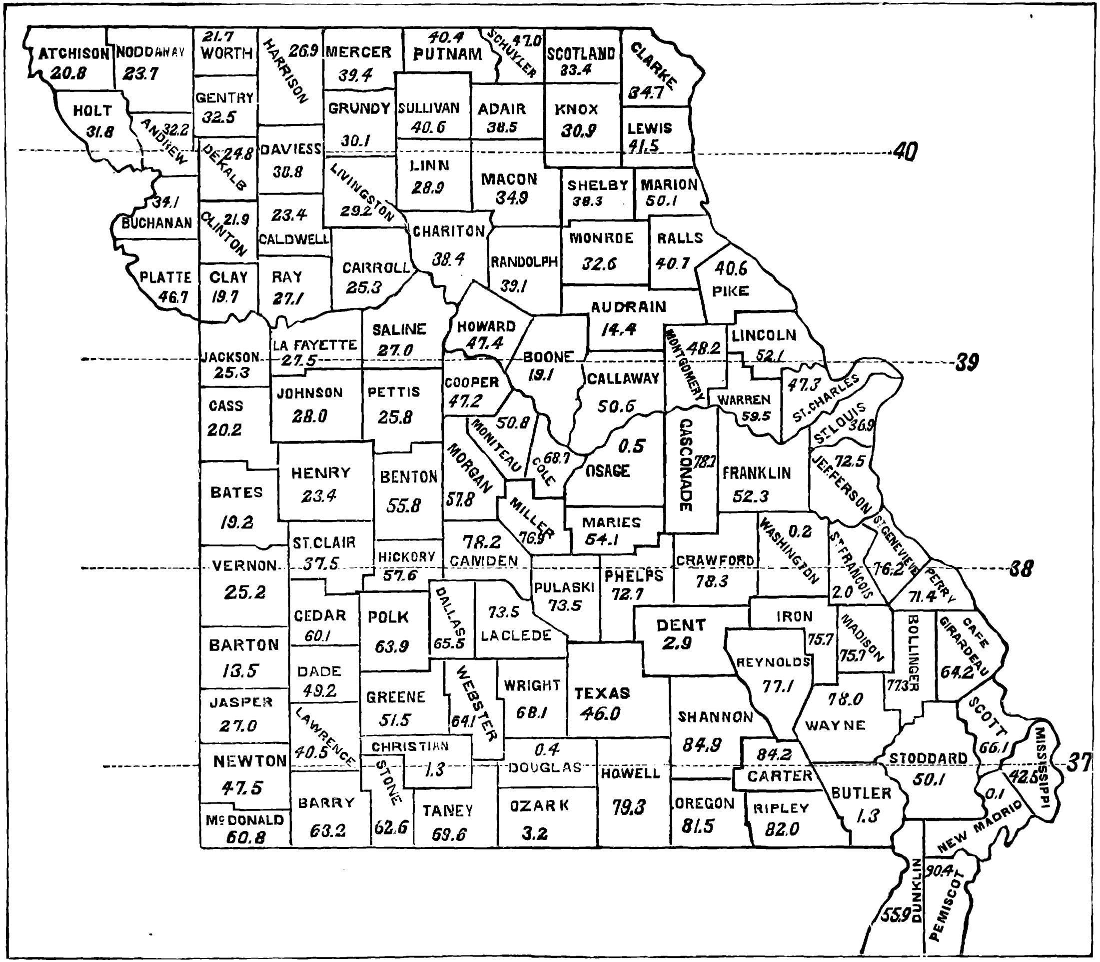


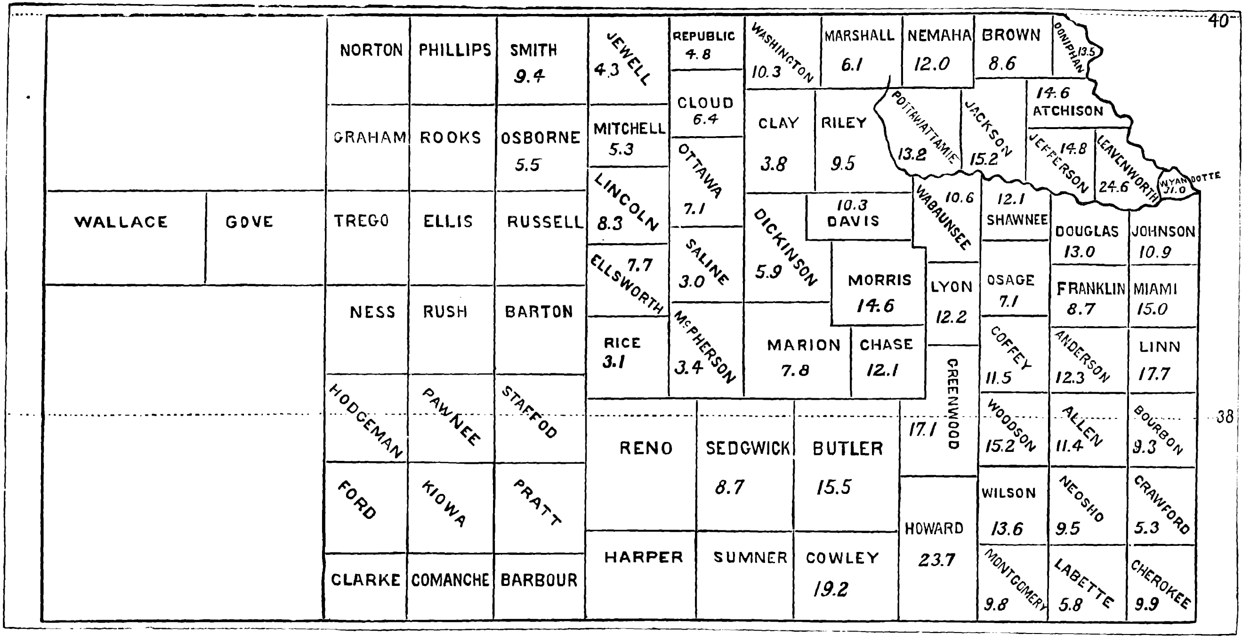
PLATE LIII.

MISSOURI

of *Franklin* is good timber-land, which sells at $1.25 to $10 per acre. *Saint Francois* is well wooded, yielding 50 cords per acre; corded for the railroad, it is worth $2 per cord; for other purposes, $1.50; made into plank, $10 per M; into coal, 8 cents per bushel. A cord of wood averages 40 bushels of coal. The timber-land of *Cass* covers about 60,000 acres. The greater portion of the valuable timber has been cut off. An acre of good timber yields 3,000 rails. In *Cole*, the forests, covering 90 per cent. of the area, yield 50 to 75 cords per acre, selling at $1 per cord, standing. Vast quantities are shipped for railroad-ties. In the arable section the wooded land of *Howard* yields about 150 cords per acre, while the bottoms average from 200 to 300. *Iron* is principally covered with oak, but in some localities pine predominates, yielding from 2 to 10 M per acre; average yield of the county, 20 cords. Half the area of *Newton* is in timber, principally oak. Bottom-lands abound mainly in walnut. In *Montgomery*, bottom-land timber is worth, per acre, $5; upland, $2.50. Cord-wood sells at $2.50 per cord; lumber, $15 per M. In *Stoddard*, the forest-area is 300,000 acres. The bottom-land, 200,000 acres, yields 50 M of lumber and 50 cords of wood per acre; the uplands, 100,000 acres, 10 M of lumber and 25 cords of wood per acre. Lumber sells from $12 to $15 per M; wood, $2 per cord. The forest-area of *Ripley* is about five hundred and eighty-five square miles. Yellow pine is predominant, and is only cut to supply local demand. Some oak is shipped to New Orleans. In *Christian*, oaks, hickory, and pine are the principal timber, selling from $3 to $8 per acre. Timber in this county is rather "scrubby." *Daviess* is half in timber-land, averaging 600 rails, or 30 cords, per acre. The forest-area of *McDonald* is 200,000 acres, mostly in pine and oaks. There are six saw-mills in the county constantly at work. *Carter* is well timbered, mainly with pine, oaks, and hickory. Wood, in *Bollinger*, sells, delivered, at $1.50 to $2. Oak, poplar, and pine lumber sells for about $10 to $15 per M, at the mills. There is a steam stave-factory in the county. Timber is valued at about 25 cents to $3 per acre. The forest-area of *Caldwell* has increased vastly since prairie-fires have been put under control. The average price of timber-land is $10. One-fourth the area of *Harrison* is in timber. Since the checking of prairie-fires a thrifty growth of young wood has sprung up. Timber-land is estimated at $5 to $20 per acre. *Johnson* estimates its forest-lands one-third the area of the county. Bottom-lands and well-wooded uplands yield 50 cords per acre, selling at $2.50 to $3; lumber, $20 to $30 per M. The forest-area of *Vernon* is 105,000 acres. Of this, 40,000 is upland-timber, valued at $7.50 per acre, standing; made into rails, $2 per hundred, at the stump. Bottom-land timber sells at $12.50 per acre. Frequently a single tree sells for $10 to $15. From 10 to 12 per cent. of the area of *De Kalb* is woodland, selling from $10 to $35 per acre. Wood, per cord, in the tree, $1; rails, in the tree, $1.50 to $3 per 100. On an average, fair woodland yields 20 cords per acre. *Holt* has an area of 70,400 acres of timbered lands, chiefly cottonwood, black oak, elm, and black walnut; average yield per acre, 50 cords. Annual product of lumber, 15,000 M, selling at $12.50 to $40 per M. The reproduction of cottonwood averages 1¼ inches in diameter annually; honey-locust, 1 inch; the black walnut in twenty-five years makes good lumber. The forest-area of *Dade* during the last thirty years has increased 100 per cent. in consequence of the checking of prairie-fires. Two-fifths the area of the county is woodland, divided into bottoms, upland, young timber, and brush-land. Wood, in *Phelps*, ranges from $2.25 to $2.50 per cord. Average per acre, 40 cords. *Adair* has one-third its area in woodland; white oak on uplands, soft maple and bass-wood in the bottoms. Unimproved pine-lands in *Oregon* are estimated at $2 per acre; other timbered

land, about $1. In *Bates*, 83,200 acres are woodland, estimated at $10 per acre. Coal is used for fuel. *Henry* contains about 75,000 acres timber-land. The best timber, desirably located, sells for $30 per acre. The market-price of good hickory at Clinton is $4 per cord; less in other localities. Timber, in *Lawrence*, ranges from $4 to $40 per acre. Cord-wood, made of the inferior quality of timber, sells at $1.50 to $2 per cord. Cherry and walnut are worth $40 per M. *Camden* has 72 per cent. of its area in woodland. Black walnut sells at $35 per M. Black-jack, covering 87 per cent. of the timber-area, sells for $2.50 to $2.75 per cord, delivered at the railroad. In *Carroll*, there is, along the Missouri River, a belt of fine walnut and cottonwood timber, equal to one hundred square miles, selling at $10 to $25 per acre. The bluff-timber, mainly oak, is valued at $20 to $30 per acre. A small belt of timber in the eastern portion is estimated at $3 per acre. *Boone* has a timber-area of 353,800 acres, yielding, on an average, about 65 cords per acre. Average price per cord, cut and piled in the woods, is about 80 cents.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adair	91, 571	38. 5	Livingston	59, 911	29. 2
Andrew	79, 073	32. 2	Macon	110, 096	34. 9
Atchison	30, 311	20. 8	Madison	62, 839	75. 7
Audrain	39, 515	14. 4	Maries	65, 847	51. 1
Barry	66, 180	63. 2	Marion	104, 592	50. 1
Bartow	13, 417	13. 5	McDonald	40, 762	60. 8
Bates	53, 050	19. 2	Mercer	81, 429	39. 4
Benton	134, 413	55. 8	Miller	138, 932	76. 9
Bollinger	143, 514	77. 3	Mississippi	26, 352	42. 5
Boone	68, 476	19. 1	Moniteau	116, 759	50. 8
Buchanan	58, 450	34. 1	Monroe	115, 602	32. 6
Butler	1, 082	1. 3	Montgomery	89, 543	48. 2
Caldwell	45, 170	23. 4	Morgan	100, 220	57. 8
Callaway	210, 283	50. 6	New Madrid	95	0. 1
Camden	71, 615	78. 2	Newton	60, 166	47. 5
Cape Girardeau	178, 619	64. 2	Nodaway	59, 858	23. 7
Carroll	74, 669	25. 3	Oregon	69, 542	81. 5
Carter	34, 063	84. 2	Osage	1, 327	0. 5
Cass	62, 337	20. 2	Ozark	1, 244	3. 2
Cedar	84, 809	60. 1	Pemiscot	84, 342	90. 4
Chariton	98, 015	38. 4	Perry	158, 993	71. 4
Christian	1, 661	1. 3	Pettis	79, 282	25. 8
Clarke	71, 624	34. 7	Phelps	104, 564	72. 7
Clay	40, 361	19. 7	Pike	140, 444	40. 6
Clinton	44, 004	21. 9	Platte	102, 286	46. 7
Cole	73, 088	68. 7	Polk	175, 519	63. 9
Cooper	145, 123	47. 2	Pulaski	44, 894	73. 5
Crawford	143, 794	78. 3	Putnam	83, 009	40. 4
Dade	66, 075	49. 2	Ralls	73, 216	40. 7
Dallas	101, 638	65. 5	Randolph	105, 555	39. 1
Daviess	105, 561	38. 8	Ray	79, 368	27. 1
De Kalb	41, 983	24. 8	Reynolds	56, 025	77. 1
Dent	4, 163	2. 9	Ripley	50, 836	82. 0
Douglas	228	0. 4	Saline	88, 190	27. 0
Dunklin	35, 743	55. 9	Schuyler	67, 382	47. 0
Franklin	194, 877	52. 3	Scotland	78, 088	33. 4
Gasconade	177, 786	78. 7	Scott	63, 724	66. 1
Gentry	63, 967	32. 5	Shannon	50, 851	84. 9
Greene	121, 647	51. 5	Shelby	61, 445	38. 3
Grundy	56, 164	30. 1	Saint Charles	126, 227	47. 3
Harrison	77, 223	26. 9	Saint Clair	44, 628	37. 5
Henry	67, 075	23. 4	Saint Genevieve	120, 027	76. 2
Hickory	77, 790	57. 6	Saint Francois	3, 017	2. 0
Holt	52, 751	31. 8	Saint Louis	79, 386	36. 9
Howard	116, 418	47. 4	Stoddard	99, 891	50. 1
Howell	61, 233	79. 3	Stone	19, 997	62. 6
Iron	53, 435	75. 7	Sullivan	108, 146	40. 6
Jackson	70, 914	25. 3	Taney	26, 052	69. 6
Jasper	50, 909	27. 0	Texas	101, 443	46. 0
Jefferson	193, 487	72. 5	Vernon	55, 924	25. 2
Johnson	108, 712	28. 0	Warren	103, 878	59. 5
Knox	86, 098	30. 9	Washington	431	0. 2
Laclede	88, 931	73. 5	Wayne	97, 766	78. 0
La Fayette	75, 839	27. 5	Webster	93, 541	64. 1
Lawrence	70, 627	40. 5	Worth	24, 122	21. 7
Lewis	108, 970	41. 5	Wright	96, 557	68. 1
Lincoln	156, 110	52. 1			
Linn	66, 393	28. 9	Total	8, 965, 229	41. 3



Kansas.

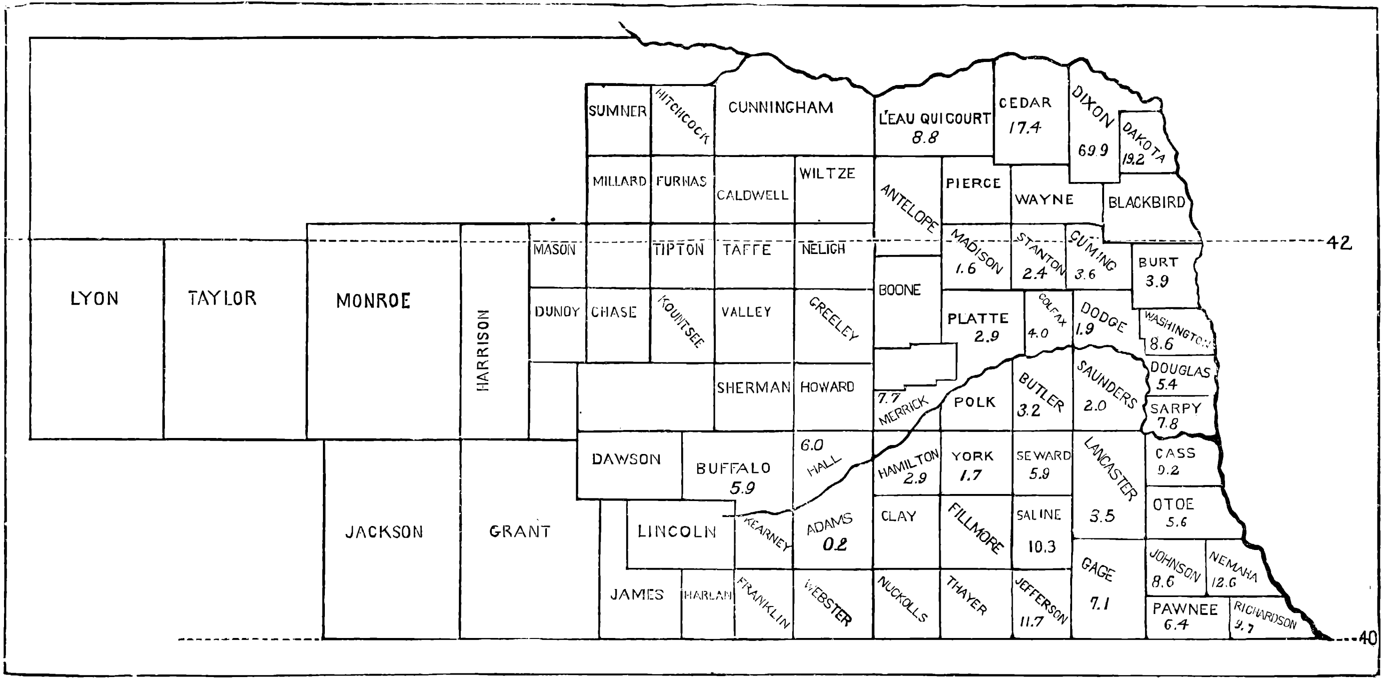
PLATE LIV.

KANSAS AND NEBRASKA.—The original forest-area in these States was quite small, and chiefly confined to the borders of streams. The trees are almost exclusively deciduous, though red cedar is reported in Nebraska. The most important kinds are black walnut, cottonwood, varieties of oak and locust, ash, hickory, elm, soft maple, box-elder, and osage orange. On original prairies, forest-growth is increasing rapidly from two causes: The first is, the arrest of prairie-fires by cultivation, which has resulted extensively in the spontaneous springing up on uncultivated portions of a thick growth of young trees, which grow with wonderful thrift; the second cause is, the planting of forests, now doubly stimulated by legislative encouragement and by assured success in respect to both growth and profit. In addition to personal advantages to the planter, in the increased comfort, beauty, and money-value of his premises, it is claimed that a public benefit is already perceptible in a modification of the climate, particularly in the way of assuaging the severity of the once unimpeded winds. The principal varieties successfully cultivated are black walnut, cottonwood, (alleged to yield the most wood and profit per acre for the time and outlay,) poplar, soft maple, white ash, American and European larch, honey-locust, and osage orange. The latter is planted both for hedges and timber. In Nebraska, young cottonwood-trees, pulled up by the thousand from the sand-bars of the Missouri and Platte Rivers, and planted, are reported as growing with scarcely an exception, and, in the third year, affording from the limbs cuttings for further propagation.

KANSAS.—The woodland of *Atchison* covers about 10 per cent. of its area. The price of lumber ranges from $11 to $22 per M; wood, per cord, $3 to $5, and posts, $6 to $12 per hundred. In *Lyon*, the black walnut is the most valuable timber. Where forests have been cleared off, a dense undergrowth of valuable wood is springing up. The osage-orange hedge-plant promises to be an important timber-tree. In *Butler*, timber is confined to belts of a quarter to a mile in width, skirting the streams. Wood sells at $4 per cord. Upland farmers are planting groves. *Shawnee* has a timber-area of 21,120 acres, and is increasing where fires are kept out. *Crawford* is a prairie county, having timber only along the water-courses. For fuel coal is used. *Anderson* comprises a forest-area of about 18,000 acres. The black walnut is as fine as can be found anywhere. Wood sells from $3 to $4 per cord. In *Leavenworth*, where twenty years ago timber was cut down, a thrifty and valuable young growth has sprung up. The timber-land of *Douglas* lies in narrow belts along streams. Woodland planted some eighteen years ago now makes 20 cords per acre; cord-wood sells, in market, at $3 to $5 per cord. *Cherokee* is thinly timbered, except along water-courses. Walnut, hickory, and oak lumber is worth from $22 to $30 per M; cottonwood, sycamore, maple, elm, and ash, from $16 to $22. Rails, in the timber, sell from $4 to $6.50 per 100; posts, from $4.50 to $7.50 per 100. In consequence of the herd-law, the value of timber-land within the last five years has fallen very much; it can be bought of the railroad company from $8 to $15 per acre. The timber-land of *Miami* is confined to low bottoms and water-courses, averaging about 75 cords per acre, worth, at the stump, from $1.30 to $1.50 per cord. The best woodland is worth $20 per acre. In *Pawnee*, there is but very little timber, and that skirting streams. In the third year of the settlement of *Reno*, the young groves of only two years' growth were all destroyed by grasshoppers. About 5 per cent. of the area of *Elk* is in natural timber, valued at $35, and averaging about 25 cords per acre. Originally *Bourbon* was well timbered, but the forests have been

cut down for fencing and building; forest-land now sells at about $15 per acre. Very little cord-wood made, coal being cheaper. Timber-land in *Smith* is confined to water-courses. Wood, used only for fuel, sells at $2 to $6 per cord. *Jefferson* has only 15 per cent. of its area in woodland, which sells at $10 to $75 per acre. The forest-area is rapidly increasing, in consequence of the stopping of prairie-fires and the planting of new groves. The timber-land of *Saline*, found only along streams, sells at $50 to $100 per acre. Wood is worth $5 to $7 per cord. The planting of forest-trees on cultivated land has, so far, been unsuccessful. After a growth of from three to five years the trees die. *Mitchell* has but 2 per cent. of its area in forests; under the "timber-act," however, hundreds of acres of forest-trees have been planted. Wood is worth from $2.50 to $3 per cord; sawed lumber, from $20 to $30 per M. About one-eleventh the area of *Sedgwick* is in woodland. Wood, at the stump, sells at $4 per cord; cottonwood fencing-boards, $22 per M. The woodland of *Republic* lies along water-courses, averaging about 7 cords per acre of a poor quality of wood. About one-fifth the area of *Wyandotte* is in timber, principally oak, walnut, elm, and bass. Land timbered with oak sells at about $15 per acre net. The product of wood per acre is 25 cords, selling at $1 per cord net. *Franklin*, a prairie county, has but about 7 or 8 per cent. of its area in woodland. The product, for wood, sells at $5 to $10 per acre; for lumber, $10 to $15. *Nemaha* has about 5,600 acres in timber, selling at $30 per acre, and averages about 35 cords to the acre, worth $4.50 per cord. In the market, posts sell at $12 per 100. One-sixth the area of *Doniphan* is forest. Cottonwood grows most rapidly, selling, per cord, in the woods, at $2; lumber, at the mills, per M, at $12 to $20. Hard woods are worth $2 to $3 per cord; lumber, $25 to $40 per M. Posts sell at $10 per 100. Planting forests is growing in favor. That a forest of fifteen years' growth will produce 20 cords per acre is claimed as a moderate estimate. The timbered land of *Marshall*, covering 6 to 7 per cent. of the area, lies along the streams, and sells for $25 per acre; the heaviest timbered, for $40 to $50. Planting timber has been successful, but the great increase of forest-area is due to the stopping of prairie-fires. Cord-wood sells at $3.50 to $4 per cord; oak and black-walnut posts, at $10 per 100; cottonwood lumber, $15 per M; oak and other hard wood, $20, and black walnut at $30. *Barton* has but little forest, and this along streams. The growth, low and stunted, is used only for fuel. Flattering results have been obtained from planting tree-seeds and cuttings. Last year, cottonwood cuttings made a growth of from 4 to 7 feet; box-elder and ash, from 2½ to 4 feet. The woodland of *Linn* covers an area of from 40,000 to 50,000 acres, valued at $10 to $25 per acre, and averaging from 10 to 50 cords per acre. Lumber sells at $15 to $20 per M. There is an abundance of excellent wagon-timber. In *Ellsworth*, there is but very little timber, and that of inferior quality. *Ottawa* has but 4 per cent. of its area in timber. Cottonwood sells, in the city, at $3 per cord; oak and other hard woods, at $4. *Dickinson* reports 15,000 acres in woodland, averaging 20 cords per acre, worth $3.50 per cord. The price of timbered land in *Jackson* varies from $20 to $50 per acre. Black-walnut lumber is worth $20 to $30 per M. Oak-posts sell at $10 per 100. Cord-wood is worth $4 per cord. About 8 per cent. the area of *Brown* is timber-land, which is constantly increasing as new groves are planted, and other woodland is protected from annual prairie-fires. The timbered land worth from two to four times as much as prairie-land. The wood in *Osage* is of poor quality, being mostly white elm, white hickory, and cottonwood. A fine growth of

PLATE LV.



NEBRASKA.

young timber is springing up and spreading over prairies protected from fires. Cottonwood cuttings, planted nine years ago, are now trees 30 feet high and 12 inches in diameter. Soft maple and white ash, from seed, have, in six years, attained a height of 20 feet and are 4 to 6 inches in diameter. In *Clay*, forest-land is worth from $50 to $100 per acre. The forest-area of *Washington* is rapidly increasing, due to planting the high prairie-lands and to keeping out annual fires. Timber-land is worth from $15 to $30 per acre. Lumber, at the mills, sells at $20 per M; cord-wood, from $3 to $3.50 per cord; posts, $15 per 100, and rails, $3 per 100. *Labette* has 10 per cent. of its area in timbered land, about 5 per cent. of which is artificial forest. Young trees, planted, make an astonishing growth. Osage-orange hedge-plants grow about 8 feet in a year; cottonwood, 6; black locust and catalpa, 5. Timbered land is worth twice as much as prairie-land. *Lincoln* is but sparsely timbered; within the last two years many young groves have been started. Cord-wood sells for $4 to $5 per cord. The timber-land of *Allen* lies in belts, averaging a mile in width, along the Neosho and Marmaton Rivers and their tributaries, for a total length of one hundred miles. *Neosho* contains about 39,000 acres in timber-land, worth, per acre, $12. Black-walnut lumber sells for $40 per M, other kinds at $20; rails, $2 per 100.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Allen	8, 070	11. 4	Lyon	13, 381	12. 2
Anderson	14, 066	12. 3	Marion	1, 118	7. 8
Atchison	24, 132	14. 6	Marshall	9, 244	6. 1
Bourbon	23, 570	9. 3	McPherson	1, 586	3. 4
Brown	10, 121	8. 6	Miami	29, 463	15. 0
Butler	10, 735	15. 5	Mitchell	1, 708	5. 3
Chase	6, 704	12. 1	Montgomery	16, 603	9. 8
Cherokee	22, 742	9. 9	Morris	5, 199	14. 6
Clay	2, 936	3. 8	Nemaha	19, 430	12. 0
Cloud	6, 260	6. 4	Neosho	12, 459	9. 5
Coffey	12, 806	11. 5	Osage	11, 628	7. 1
Cowley	12, 853	19. 2	Osborne	220	5. 5
Crawford	13, 616	5. 3	Ottawa	6, 030	7. 1
Davis	5, 265	10. 3	Pottawatomie	14, 141	13. 2
Dickinson	3, 545	5. 9	Republic	3, 404	4. 8
Doniphan	20, 935	13. 5	Rice	025	3. 1
Douglas	27, 936	13. 0	Ripley	9, 566	9. 5
Ellsworth	1, 502	7. 7	Saline	3, 440	3. 0
Franklin	14, 064	8. 7	Sedgwick	3, 388	8. 7
Greenwood	13, 272	17. 1	Shawnee	11, 918	12. 1
Howard	2, 253	23. 7	Smith	652	9. 4
Jackson	18, 103	15. 2	Wabaunsee	9, 122	10. 6
Jefferson	29, 586	14. 8	Washington	5, 184	10. 3
Jewell	866	4. 3	Wilson	8, 362	13. 6
Johnson	20, 425	10. 9	Woodson	4, 984	15. 2
Labette	12, 058	5. 8	Wyandotte	11, 924	31. 0
Leavenworth	43, 821	24. 6			
Lincoln	1, 082	8. 3	Total	635, 419	11. 2
Linn	37, 926	17. 7			

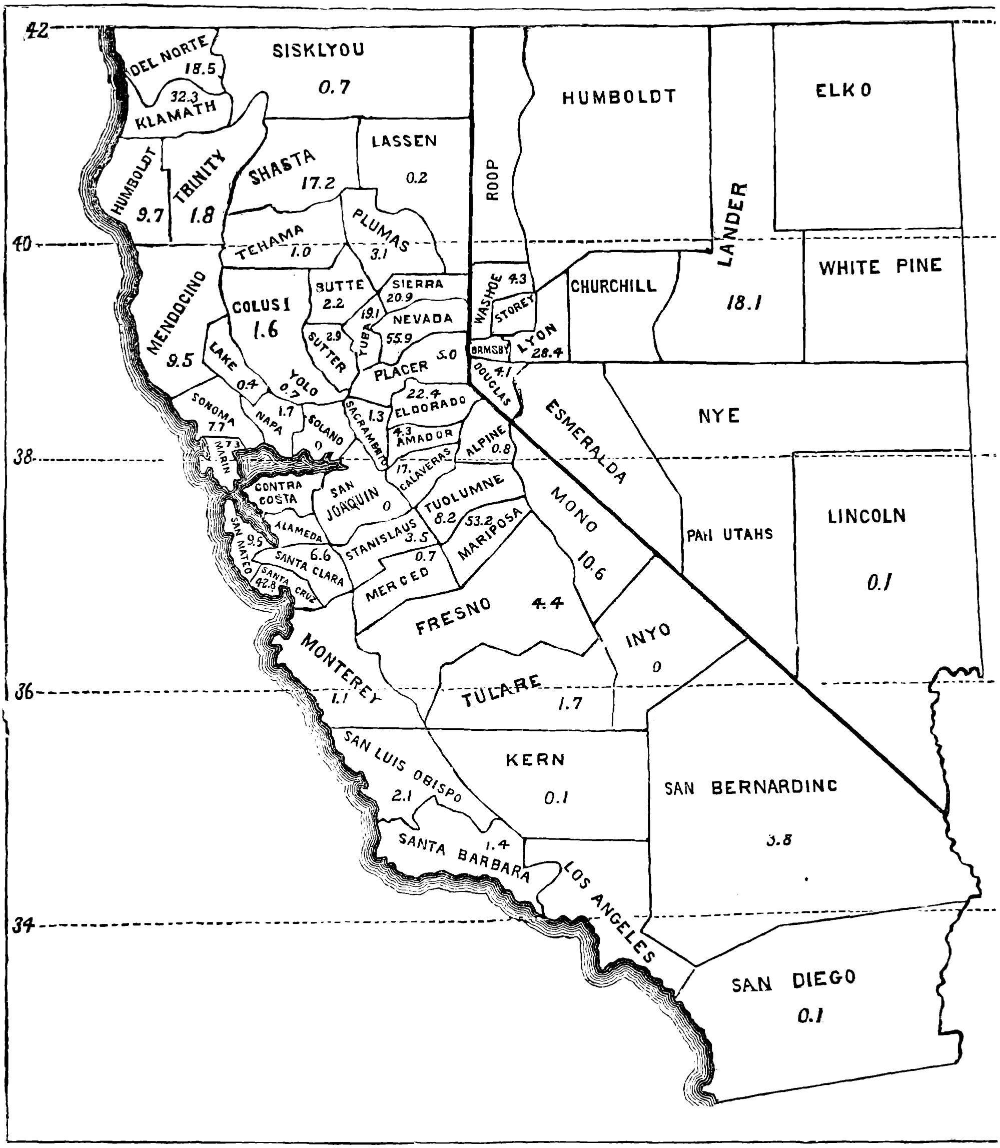
NEBRASKA.—*Adams* has a very limited forest-area, lying chiefly along the Little Blue River; product of wood, 100 cords to the acre. As the prairie-soil is favorable to the growth of timber, many new forests have been planted. Timbered land in *Antelope* is worth $20 per acre. Many artificial groves are starting with good success. In *Cass*, almost every prairie-farm has timber under cultivation. Of the varieties planted, black locust, black walnut, soft maple, and cottonwood; the last is the hardiest, most productive, and fastest grower; making, after eight years' growth, from 5 to 8 cords per acre, worth $3 per cord. *Clay* has about 6,000 acres natural forest and 10,000 acres artificial. Soft wood brings $3 per cord, and hard wood $4. *Dixon* reports 4,008 acres natural forest and 1,085 acres artificial cottonwood groves. The best forest

in *Franklin* is timbered with cottonwood, and makes about 40 cords of wood and 10 M of lumber per acre. *Furnas* has 4,880 acres in forest, in which cottonwood, box-elder, and ash each constitute 25 per cent., and elm 20 per cent. Half is fit for timber; worth $20 per acre. The natural forests of *Hall* were for the most part destroyed by the Union Pacific Railroad. Many farmers have planted artificial groves from 2 to 40 acres in size. There are now about 500 acres of timber under cultivation. Groves of cottonwood and black locust started sixteen years ago have, respectively, trees 70 and 35 feet high. Forest-culture in *Knox*, principally of cottonwood, is just beginning. Soft wood sells for $2 per cord, hard wood at $4. In *Lancaster*, woodland, with large timber, makes about 40 cords to the acre. Cottonwood, corded, is worth $3 to $4 per cord; oak, $7 to $8. In artificial groves of cottonwood, there are over 3,000 trees to the acre. The native timber in *Madison* is mostly cottonwood and box-elder, confined to streams. Nearly every homestead now has planted from 1 to 10 acres in timber. Wood is worth $5 to $6 per cord. There is very little natural timber-land in *Merrick*, but many artificial cottonwood groves. Soil very favorable to tree-planting, whether forest or orchard. *Richardson* has about 5 per cent. of its area in timber, lying along water-courses, especially on the bluffs of the Missouri. This land is worth from $10 to $50 per acre. The woodland of *Webster* covers about 3,000 acres. The farmers appreciate the advantages of the "timber-act." Many claims have been taken and planted with groves of cottonwood, box-elder, and ash. *York* has only about 600 acres in forest, averaging about 75 cords to the acre; principally of elm, cottonwood, and ash.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Adams	6	0.2	Lancaster	4,312	3.5
Buffalo	83	5.9	L'Eau-qui-Court	894	8.8
Burt	3,693	3.9	Lincoln		
Butler	1,318	3.2	Lyon		
Cass	11,994	9.2	Madison	278	1.6
Cedar	5,509	17.4	Merrick	719	7.7
Clay			Monroe		
Colfax	689	4.0	Nemaha	3,042	12.6
Cuming	3,487	3.6	Nuckolls		
Dakota	11,250	19.2	Otoe	9,495	5.6
Dawson			Pawnee	8,272	6.4
Dixon	83,155	69.9	Pierce		
Dodge	2,419	1.9	Platte	1,608	2.9
Douglas	3,544	5.4	Polk		
Fillmore			Richardson	17,095	9.7
Franklin			Saline	2,056	10.3
Gage	6,808	7.1	Sarpy	5,757	7.8
Grant			Saunders	1,302	2.0
Hall	931	6.0	Seward	6,076	5.9
Hamilton	167	2.9	Stanton	820	2.4
Harrison			Taylor		
Jackson			Washington	8,156	8.6
Jefferson	5,370	11.7	Wayne		
Johnson	3,319	8.6	York	350	1.7
Jones					
Kearney			Total	213,374	10.2

CALIFORNIA has already developed a wide-spread interest in tree-culture. Thus far, the *Eucalyptus*, or blue-gum tree, appears to have received more attention and been more extensively planted than any other kind. *Alameda* has no natural forests, but vast numbers of *Eucalyptus* groves are made. *Amador* reports annually sawed 4,000 M of pine-lumber, sold at $25 per M, and 20,000 cords of oak and pine wood, at $7 per cord. The mines consume annually 10,000 sticks, averaging 14 feet by $1\frac{3}{4}$, worth $30,000. In 1875, 20,000 cords were shipped. *Del Norte* is one of the best-timbered counties. There is a belt of red-wood, equal to thirty

PLATE LVI.



California and Nevada.

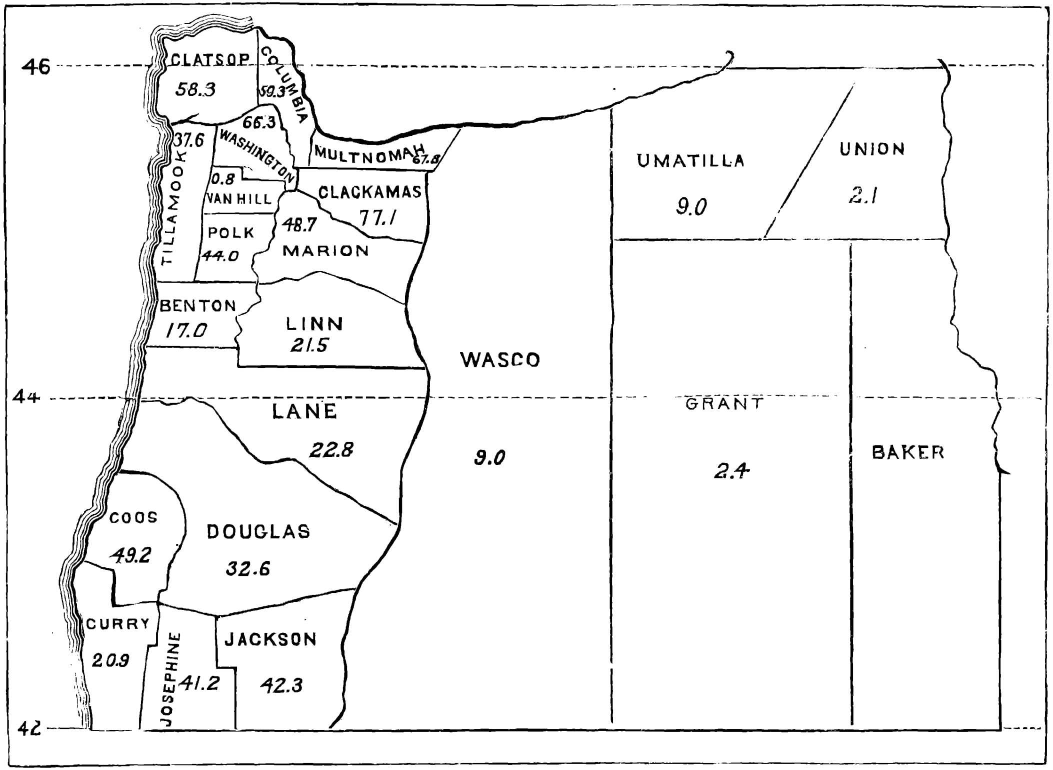
square miles, along the coast, available for shipment. Farther back, and not yet available, are quantities of valuable sugar and yellow pine. The principal woods in *El Dorado* are pine and oak. Lumber, at the mills, sells from $10 to $20 per M; cord-wood, on the ground, at $1.75 to $2 per cord. *Colusa* has some good pine-timber in the Coast Range Mountains, but as yet inaccessible; also some oak along water-courses. In *Contra Costa*, during 1849 and 1850, the forests were totally destroyed. There are scattering growths of black, live, and white oaks, on hill-sides, valued at $20 to $50 per acre. Cord-wood, on the stump, sells at $2 per cord. Efforts are making to replace destroyed forests with artificial groves; the most valuable tree to this end is the blue-gum, (*Eucalyptus.*) The cork-oak acorns distributed by the Department twelve years ago are now in bearing. The timber of *Lake* is mainly oak and pine. The former is in the valleys, 20 to 50 large trees on the acre, some trees making 12 to 16 cords. Cord-wood sells for $3.50. Pine-timber averages 50 to 100 trees per acre, 4 to 8 feet in diameter, 150 to 200 feet high. Some saw-logs make 2,500 feet lumber. Originally *Marin* had 5 per cent. of its area in timber; now but one-half of this stands. The heaviest red-wood lands sell for $100 (gold) per acre. Probably the average price per acre for the county is $16. Much attention is now given to planting groves, principally with blue-gum (*Eucalyptus*) trees. The woodland of *Merced* lies on the Merced River; principally oak and willow, with some ash, cotton-wood, and maple. Wood per cord, $8. The more valuable forest-area of *Napa* is in the Napa Valley, forty miles long, with an average width of three miles. Through it are scattered different varieties of oak. There are, in the mountains, forests of pine, and 1,000 acres of red-wood, not yet accessible, valued at $20 per acre. The black alder makes superior charcoal for gunpowder, and a species of laurel excellent timber for ship-building. One-half of the area of *Placer* is in forest, a vast extent of which is yet open to pre-emption. The most valuable timber is sugar-pine. There are 29 saw-mills in the county, annually manufacturing 27,670 M of lumber; besides this, 5,000,000 shingles are made. About 80 per cent. of the area of *Plumas* is woodland. The most available timbers are sugar, spruce, and yellow pine, California cedar, and balsam-fir. Tracts of timber yield 200 cords per acre. The height of timber ranges from 175 to 300 feet. *San Diego* has no forests. Some pine and oak trees are found along ravines near the coast. *San Joaquin*, with the exception of narrow belts in river-bottoms, has no timber. Forest-cultivation, of necessity, is attracting attention. "Australian gums" are most successful. About one-fifth the area of *San Luis Obispo* is woodland, principally white oak and pine, and, in low bottoms, willow and cottonwood. Pine-land sells for $20 to $40 per acre; oak-land, $6 to $10. Pine lumber is sold, at the mills, at $15 per M; cut wood, on the ground, $3.25 per cord. *Santa Barbara* has very little timber. There are some oaks along cañons, and sycamores lining streams. Forest-planting is attracting attention, as in a few years the natural forests will have been cut away. In *Stanislaus*, there are 10,000 acres of woodland, (mostly white oak,) ranging from $10 to $20 per acre. An acre of this land yields 5 to 15 cords, worth $2.50 to $3.50 per cord, on the land; price for cutting, $1 per cord. About 30 per cent. of the area of *Sutter* is park-land, with oak-trees standing 1 to 2 rods apart, good only for cord-wood, which sells at $4 per cord. In *Trinity*, the mountains and foot-hills are heavily timbered with pine; the valleys have but little timber. The eastern half of *Tuolumne* is covered with a fine growth of pine and fir, averaging 25 M of lumber per acre, and of black and white oak, making about 25 cords per acre.

Of *Yuba*, a little more than half the area is heavily timbered, the remainder, valley land, has a scattering growth of white oak. Mountain timber is mostly sugar-pine, nut, or pitch-pine, red-wood, California cedar, and laurel. There is an area of 200 square miles, which makes 200 cords per acre.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Alameda	625	0. 2	Plumas	2, 140	3. 1
Alpine	1, 180	0. 8	Sacramento	5, 699	1. 3
Amador	2, 640	4. 3	San Bernardino	860	3. 8
Butte	4, 967	2. 2	San Diego	503	0. 1
Calaveras	13, 666	17. 0	San Francisco	....	....
Colusa	29, 395	6. 1	San Joaquin	....	....
Contra Costa	6, 140	2. 0	San Luis Obispo	12, 058	2. 1
Del Norte	4, 065	18. 5	San Mateo	15, 060	9. 5
El Dorado	29, 264	22. 4	Santa Barbara	11, 746	1. 4
Fresno	6, 191	4. 4	Santa Clara	21, 246	6. 6
Humboldt	11, 647	9. 7	Santa Cruz	44, 351	42. 8
Inyo	....	....	Shasta	6, 680	17. 2
Kern	310	0. 1	Sierra	4, 817	20. 9
Klamath	4, 020	32. 3	Siskiyou	688	0. 7
Lake	619	0. 4	Solano	100	....
Lassen	100	0. 2	Sonoma	38, 392	7. 7
Los Angeles	....	....	Stanislaus	19, 006	3. 5
Marin	23, 197	7. 3	Sutter	6, 998	2. 9
Mariposa	44, 310	53. 2	Tehama	2, 230	1. 0
Mendocino	14, 950	9. 5	Trinity	155	1. 8
Merced	4, 138	0. 7	Tulare	1, 530	1. 7
Mono	2, 500	10. 6	Tuolumne	5, 110	8. 2
Monterey	11, 196	1. 1	Yolo	3, 837	0. 7
Napa	1, 572	1. 7	Yuba	29, 756	19. 1
Nevada	20, 943	55. 9			
Placer	7, 283	5. 0	**Total**	477, 880	4. 1

OREGON.—*Baker* has a timber-area of five hundred square miles, ranging from $2.50 to $10 per acre. The timber is principally pine and fir. Wood is worth $4.50 per cord, (gold;) clear lumber, $25 per M; common, $15. The timber-land of *Benton* lies in a belt of one-eighth mile wide by forty-five miles in length, along Willamette River, and another belt in the Coast Range Mountains, twenty-five by thirty miles. The former belt will average 5 M of timber and 50 cords per acre. About 25 per cent. of the mountain-timber is good, and will average 10 M of lumber per acre. *Clackamas* is one of the best-timbered counties in the Willamette Valley; fully one-half its area is in heavy timber. Firs are most abundant and useful. The valley-lands average 300 cords, or 40 M of lumber, per acre; mountain-lands, 500 cords, or 400 M of lumber per acre. Much of this lumber is sold to San Francisco and the Sandwich Islands. Rough red and yellow fir-lumber brings, in the market, $12 per M; spruce and white fir, $18; white cedar, oak, maple, and ash, $50; cord-wood sells at $2 to $4 per cord. About two-thirds the area of *Curry* is covered with forests of yellow, red, and white fir, sugar-pine, white cedar, spruce, white, and other oaks, and madroño. The timber-lands of *Douglas* are principally covered with the different varieties of evergreens and oaks. There are thousands of acres which would yield 300 to 600 cords per acre not yet taken up. Oak-timbered land yields on an average 100 cords per acre, worth $2 per cord, at the stump. Fir-lumber is worth $10 per M, at the mills; pine and cedar, $20 to $30. Not over one-third the area of *Lane* is woodland. This embraces the different varieties common to the Pacific coast. Oak-wood, delivered, is worth $3 to $4 per cord. The timber-land of *Linn*, occupying half its area, is comprised in three belts of dense forests, half of which is red fir. Within the last twenty-four years, thousands of acres of woods have grown up from seed; trees 40 to 80 feet high, with a diameter from 10 inches to 2 feet. There have been made from one acre of fir-timber 6,000

PLATE LVII.



OREGON.

rails. Summer-fires, started by travelers and hunters, annually destroy some of the finest forests. *Multnomah* has a large area of timber-land, mostly yellow and red fir. The average wood-product is 50 M of timber and 50 cords. Fir grows rapidly; trees of sixteen years' growth, 70 feet high and 6 inches in diameter, have been cut. Three-fourths the area of *Tillamook* is in timber, and half of this is fir and hemlock. The wood-product, per acre, is, cedar, 20 M, worth, at the mills, $18 per M; alder and maple, 18 M, at $24; fir and hemlock, 75 M, at $10; larch and spruce, 50 M, at $8. The forests of *Umatilla* are confined to the mountains, where they are very dense, and to narrow belts along streams. *Wasco* has immense forests in the mountains, many as yet inaccessible. Rough lumber, at the mills, is worth $10 to $20 per M; wood, $4 per cord.

Counties.	Acres.	Per cent.	Counties.	Acres.	Per cent.
Baker	....	....	Linn	55, 159	21. 5
Benton	27, 959	17. 0	Marion	66, 183	48. 7
Clackamas	117, 139	77. 1	Multnomah	46, 395	67. 8
Clatsop	17, 044	58. 3	Polk	98, 761	44. 0
Columbia	18, 479	59. 3	Tillamook	2, 981	37. 6
Coos	13, 340	49. 2	Umatilla	6, 917	9. 0
Curry	2, 997	20. 9	Union	1, 726	2. 1
Douglas	114, 518	32. 6	Wasco	3, 707	9. 0
Grant	450	2. 4	Washington	73, 891	66. 3
Jackson	20, 128	42. 3	Yam Hill	1, 931	0. 8
Josephine	3, 640	41. 2			
Lane	67, 656	22. 8	**Total**	761, 001	31. 8

COLORADO.—*Boulder* is reported as having only a scattered growth of scrubby cottonwood along water-courses, and some pine and spruce on hill-sides and in deep ravines. Green lumber, at the mills, sells for $18 to $20 per M; cord-wood, $4 to $5.50 per cord, delivered. The little timber in *Concjos* grows on the mountains and skirting streams. This is fast being destroyed by fires made by Indians. *Douglas*, originally heavily timbered, now has only 1,000 acres, valued at $12.50 to $50 per acre. About one-third the area of *El Paso* is in excellent timber, averaging a yield of 30 M per acre. Nearly one-half of *Lake* is well-timbered principally with spruce and fir. Vast tracts of forest have been burned, but in their place a new growth is springing up. *Park* has half its area in forest, yielding, on an average, 20 cords per acre, worth $1 to $2 per cord. Lumber sells at $12 to $25 per M. Owing to great distance from market, most of the timber is at a nominal price, $5 to $10 per acre. The timber of *Weld* is all cottonwood, and covers an area of 2,000 acres, averaging 30 cords, and valued at $5 per acre. In *La Platte*, about 5 per cent. of the park portion is timbered, chiefly with cottonwood, on the borders of streams, while the mountainous portions are densely timbered with pine.

UTAH.—The principal forests in *Beaver* are on the mountains, mostly pitch-pine, and much of it inaccessible. Along water-courses are scattering white oaks and maples. *Box Elder* has no timber, except a little on the mountains and in cañons; it all belongs to the Government. *Iron* has only mountain-timber, mostly yellow, black, and red pine, for lumber, worth $25 per M, and white and red cedar, for cord-wood, worth $5 per cord. The principal timbers in *Kane* are cedar, piñon-pine, and spruce; much of it entirely inaccessible. Lumber, $30 per M; wood, $4.50 per cord. About one-eighth the area of *Morgan* is in mountain-timber, comprising red and white pine, firs, cedar, quaking-aspen, and cottonwood, with a scattering growth of scrubby oak and maple. The mountains of *Salt Lake*, comprising some two hundred square miles,

average, per acre, about 10 M of lumber, worth $30 per M, and 100 cords, at $5 to $8 per cord. Much wood is converted into charcoal, selling at 20 cents per bushel. Timber-land of *San Pete* is valued at $25 per acre. Timber is of inferior quality, mostly red and white pine, and black and white balsam. The timber of *Summit* grows exclusively in the cañons, and consists of red, white, and yellow pine. The most important commercial use is for railroad-ties; it is estimated that during 1875 about 3,000,000 were cut. Four-fifths of the timber-land in this county is unsurveyed. The pine-timber of *Tooele* is distributed in groves of 20 to 100 acres, aggregating between 4,000 and 5,000 acres. There are also cedar and piñon-pine groves of 5 to 30 acres, covering, in the aggregate, between 1,000 and 2,000 acres, averaging in value $25 per acre. This land is easier of access than the pine-land, which averages $4 to $5 per acre. *Utah* has no timber, except an almost inaccessible growth on the mountains, and this is scattering. The timber-supply of *Wasatch* is inadequate to the demand of the county. Pine and balsam prevail, but their inaccessibility renders development profitless. The timber-area is as 1 to 1,000. In *Weber*, it does not pay to utilize the timber, as it is almost impossible of access. Some of the lumber is of excellent quality, selling as high as $150 per M.

NEW MEXICO.—*Dona Ana* has its timber of cottonwood along the Rio Grande Valley; of shrubs, on foot-hills adjoining river-bottoms, the immense roots of which are dug up for fuel, and are almost equal to coal; and in the mountains, patches of pine, oak, and other kinds. Pine only affords saw-lumber. The osage-orange has been introduced with success, and of late the Australian gum-tree and the Monterey cypress have been planted. One-third the area of *San Miguel* is timber-land. The mountains in the northern portion of the county are covered with valuable pine, the low hills with stunted cedar and piñon; and the streams are lined with cotton-wood, China-tree, hackberry, and box-elder. *Taos* has an area of 100,000 acres, well-timbered with spruce-pine, piñon oak, cottonwood, willow, cherry, and plum.

WASHINGTON.—*Clallam* embraces an area of two thousand and fifty square miles, half unexplored, and mostly covered with forests, principally of fir, cedar, spruce, and hemlock, averaging 25 M of lumber per acre, worth, at the mills, $10 (in gold) per M. As yet only red cedar is utilized. In *San Juan*, red and yellow fir are the most valuable timbers. A tract of 100 acres will cut 100 M per acre, worth $50 per acre, standing; a tract of 2,000 acres will yield 20 M, worth $10 per acre. Fir-forests yield 100 to 500 cords of wood per acre. Owing to the quantities of better fir-timber near Puget Sound, there is but little market for the forest-products of the county. The western and settled portion of *Walla Walla* is prairie, but the eastern portion, lying on the Blue Mountains, is heavily timbered with pine, fir, and hemlock; estimated to average 100 M of timber and 200 cords of wood per acre. Near the settlements, the value is $5 to $10 per acre. *Thurston* had, in 1875, 35 logging camps, averaging 12 hands and 8 pairs of oxen each. During the season, each cut over an average area of 50 acres, yielding 45 M per acre. Logs, delivered in boom, ready for the steamer to tow to the mill, sell for $4.50 per M. One hundred miles is not an unusual distance of towing. Every large mill has one or more steamers engaged in towing, and in bringing supplies to the camps. The principal timbers are fir, cedar, white, curly, and bird's-eye maple, white ash, cherry, and alder. Of the seven hundred square miles in the county, at least three hundred are heavily timbered, "and twenty years of continuous cutting has only carried the cleared belt one and a half miles from the shore-line." In

1876, there will be but 25 logging-camps. The report from *King* states that "the Puget Sound Basin, covering an area of at least five thousand square miles, is densely covered with a heavy growth of timber, in which fir, cedar, hemlock, spruce, and pine predominate, but on the river-bottoms, alder, maple, cottonwood, and ash abound." The fir-lands average, at least, 100 M per acre, and the timbers on the bottom-lands half as much. In the county, 10 or more large mills daily manufacture, each, not less than 65 M of fir, for home use and export. The fir is extensively used in ship-building, and has no superior for that purpose." Standing timber is worth 50 cents per M; lumber, $10 to $30; wood, $3 per cord. *Stevens* has an area of thirty-six thousand square miles, one-third of which is heavily timbered with pine, fir, and mountain tamarack. The county has but two saw-mills. In *Snohomish*, the forests are estimated to yield, per acre, 40 M of superior fir-lumber and 20 M of smaller fir, hemlock, maple, and cedar. Fir-lumber is worth, at the mills, $5 per M. About 50,000,000 feet were cut in the county in 1875.

DAKOTA.—*Clay* has only about 4,000 acres of forest, nearly all cottonwood, yielding 30 to 50 cords, and worth $15 per acre. Cottonwood grows on the prairies very rapidly, and is planted for protection to orchards, gardens, and wind-breaks generally. *Davidson* has only small groves of oak, ash, elm, etc., on the margin of streams. About 100 acres were planted in cottonwood last year, and when the prairie-fires are stopped, 10 per cent. of the land will be timbered. *Hanson* contains four hundred and thirty-two square miles, and the scattered timber, principally in the valleys of the Dakota River, would not cover more than one square mile. The largest body covers but 15 acres. "About 25 per cent. of the settlers are cultivating timber, under the timber-culture act, with very good success." *Yankton* is poorly timbered, but has some forests of cottonwood, worth $20 to $40 per acre. The lumber is worth $15 per M, and wood $3 per cord.

MONTANA.—*Choteau* has no forests, except small quantities of cottonwood and quaking-aspen, along the river-bottoms. Pine and fir lumber for buildings and fences is teamed from the mountains in Lewis and Clarke County, distant twenty-five miles. *Gallatin* has in the mountains, on the north, east, and south sides, inexhaustible fir-timber for building purposes. Quaking-aspen, growing in the gulches, has thus far served for fuel both to the settlers and to the military post at Ellis. *Jefferson* is well supplied with pine and spruce on the mountains and in the ravines, but dwarfed in size; ranging about 20 inches in diameter, and short. White and yellow spruce, cottonwood, and other soft kinds, are produced, but hard-wood timber is imported. *Lewis and Clarke* has no forests of any kind in the valleys, but pine and fir in abundance on the mountains and foot-hills, estimated to yield 100 cords per acre.

ARIZONA.—*Maricopa* reports 5,000 acres in cottonwood; 150,000 acres heavily timbered with pine and oak, and 210,000 acres covered with mesquite, yielding 5 cords per acre. It is estimated that 17 per cent. of *Yavapai* is covered with a dense forest of hard pine. Cedar and juniper are also produced in abundance; while on the bottoms are found cottonwood, walnut, ash, and white and live oak.

WYOMING.—Of *Albany*, about one-third is heavily timbered. Lumber sells at $25 to $30 per M; railroad-ties, 50 cents each; wood, $4.50 to $5 per cord. There is some cottonwood along streams; 50 railroad-ties and 125 cords per acre. The principal varieties of wood in *Carbon* are white and spruce pine, cedar, cottonwood, and box-elder. Of pine, there are made annually 500,000 railroad-ties, at 50 cents apiece, and 20,000 cords, at $6 per cord. The timber-land of *Uintah* lies on mount-

ain ridges; comprising pine, spruce, fir, quaking aspen, juniper, and cedar.

INDIAN TERRITORY.—Half the area of *Choctaw Nation* is in timber-land. There is a pine-region of one hundred miles by thirty, the best of which averages 25 M of lumber per acre. Along streams there is good timber; varieties, oaks, hickory, ash, walnut, peach, cottonwood, sycamore, dog-wood, birch, elm, maple, locust, cherry, plum, and mulberry.

STATE ENCOURAGEMENT OF FORESTRY.

By a law of California, approved March 30, 1868, the board of supervisors in each county are empowered to authorize owners of lands to plant and cultivate, along the public highways, shade and fruit trees, specifying the species to be planted, at what age, at what distance from each other and from the road-bed, and making the necessary rules for their protection, &c. Four years after the planting, upon receiving a duly certified statement of the number then in a thrifty condition, the board are directed to pay to the cultivator $1 for each such tree. In October, 1872, the State board of agriculture called attention of county supervisors to this act, and urged them to do what is in their power to encourage a compliance with its provisions. They advised that the age be fixed at from three to eight years from the seed, and the minimum distance between tree and tree at 12 feet, and recommended the planting of the following varieties: Black and honey locusts; black, white, and fruiting mulberries; osage-orange, native and eastern black walnut, American chestnut, American, European, and cork-bark elm, the different varieties of maple, the tulip-tree; Carolina, Lombardy, and silver-leaf poplars; the different varieties of ash, apple, pear, plum, cherry, almond, and fig trees; the Eucalyptus or Australian blue and red gum-tree; Monterey, sugar, yellow, spruce, and Scotch pines; Norway spruce, balsam-fir, European larch, Monterey and Italian cypress, and California laurel; and red-wood.

Illinois, Missouri, and Iowa have encouraged tree-planting by State laws. Massachusetts in 1858 offered a premium of $1,000 for the best plantation of forest-trees planted in 1860, payable in 1870. It was won by Maj. Ben. Perley Poore. States, societies, and individuals have encouraged by bounties the planting of trees, with sufficient success at least to excite thought and stimulate effort upon the subject of practical arboriculture.

A recently enacted law of the United States, for the encouragement of timber-growing, contains provisions as follows:

1. The privilege of entry under this act is confined to persons who are heads of families, or over twenty-one years of age, and who are citizens of the United States, or who have declared their intention to become such.

2. The affidavit required for initiating an entry under this act (Form No. 22) may be made before the register or receiver of the district office for the land-district embracing the desired tract, or before some officer authorized to administer oaths in that district, who is required by law to use an official seal.

3. Not more than one-quarter of any one section can be entered under this act.

4. The privilege of making more than one entry thereunder is confined to such parties as shall enter, in each and every instance, a fractional subdivision of less than 40 acres, and the aggregate area of such entries shall not exceed 160 acres.

5. The ratio of area required to be broken, planted, &c., is, in all cases initiated under the first section of this act, one-fourth of the land embraced in the entry.

6. One-fourth part of the area required to be devoted to timber must be broken within one year from date of entry, one-fourth part more within two years from date of entry, and the remaining one-half within three years from date of entry.

7. One-fourth part of the area required to be devoted to timber must be planted within two years from date of entry; one-fourth part more within three years from date of entry; and the remaining one-half within four years from date of entry.

8. The trees are required to be not more than twelve feet apart each way, and the same are required to be protected, cultivated, and kept in a healthy growing condition for eight years next succeeding the date of entry.

9. If, at the expiration of the said eight years, or at any time within five years thereafter, the person making the entry, or, if he or she be dead, his or her heirs or legal representatives shall prove, by two credible witnesses, the fact of such planting, cultivation, &c., of the said timber for not less than the said period of eight years, he, she, or they shall receive a patent for the land embraced in said entry.

10. In the case of the death of a person who, having entered a quarter-section, has complied with the provisions of this act for the period of three years—that is to say, who has broken ten acres the first year, ten acres the second year, and twenty acres the third year, and who has planted ten acres with timber the second year and ten acres the third year—then, and in that case, his or her heirs or legal representatives shall be permitted, at their option, to continue to comply with the provisions of this act during the unexpired portion of eight years, and thereupon receive a patent for said quarter-section; or, on making proper proof of compliance of the deceased settler with the requirements of the act for the said period of three years, they shall receive, without delay, a patent for forty acres of said quarter-section, upon the condition that they relinquish to the United States all claim to the remainder of the land embraced in such entry.

11. If, at any time after not less than one year from the date of entry under the first section of this act, and prior to the issue of a patent therefor, the claimant shall fail to do the breaking and planting required by this act, or any part thereof, or shall fail to cultivate, protect, and keep in good condition such timber, then, and in that event, such land shall become liable to a contest in the manner provided in homestead cases, and, upon due proof of such failure, the entry shall be canceled and the land become again subject to entry under the homestead laws, or by some other persons under the provisions of this act.

12. Each and every homestead settler, at any time after the end of the third year of his or her residence, who, in addition to the settlement and improvements required by the homestead laws, shall have had under cultivation for two years one acre of timber (the trees thereon being not more than twelve feet apart each way, and in a good, thrifty condition) for each and every sixteen acres of said homestead, shall, upon due proof of such fact by two credible witnesses, receive his or her patent for said homestead.

13. No land acquired under the provisions of this act shall, in any event, become liable to the satisfaction of any debt or debts contracted prior to the issuing of the final certificate therefor.

14. The fees for all entries under this act shall be ten dollars, and the

commission of registers and receivers on all entries, irrespective of areas, shall be four dollars (two dollars to each) at the date of entry, and a like sum at the date of final proof.

15. No distinction is made as to area or the amount of fee and commissions between minimum and double-minimum lands; a party may enter 160 acres of either on payment of the prescribed fee and commissions.

16. The fifth section of the act entitled "An act in addition to an act to punish crimes against the United States, and for other purposes," approved March 3, 1857, shall extend to all oaths, affirmations, and affidavits required or authorized by this act.

17. Parties who may have already made entries under the timber-culture act of March 3, 1873, of which this is amendatory, shall be permitted to continue and complete the same in the manner and under the conditions prescribed by this act.

EXPERIMENT IN FOREST-CULTURE.

Kansas has provided for the growth and protection of forest-trees by legislative enactments which have since been repealed, so that there are none now upon the statute-books, unless of very recent enactment.

Experiments made by the Kansas Pacific Railroad for several years on the plains were apparently successful for a time, but they appear to have been abandoned. Mr. John H. Edwards writes from Ellis, commencing with the experiments made in 1871 and until 1873, by Mr. R. S. Elliott, of the railroad:

The nursery established by Mr. Elliott was suffered to remain without attention after his retirement from the road, and in consequence of which the young plants and trees set out by him have been in a measure choked out by weeds and drought. I have planted at various times the following trees: Box-elder, soft maple, and cottonwood, as forest-trees, and, for fruit, apples and peaches. I have invariably found that in order to grow successfully either forest or fruit trees, thorough and continual cultivation is necessary. The ground requires as much care and attention as for crops. Trees set out in holes dug in the sod do not receive the necessary sustenance required. I have, out of 1,000 soft maples, set out in 1873, in nursery rows, 500 good, thrifty trees, and had not the grasshoppers eaten the bark off the rest of them, I am certain that all would now have been alive. These trees, when set out in 1873, were from 12 to 18 inches high, and are now of an average height of 5 feet, with fine, healthy bark and thrifty foliage. Cottonwoods, cut and set out at the same time, trimmed down to bare poles of about 6 feet high, are to-day well-limbed, flourishing trees of large growth, measuring from 12 to 15 feet in height, and from 4 to 6 inches diameter. Two or three small trees set out in 1874, averaging about 4 feet in height, with full roots and limbs, have grown to the remarkable height of 12 feet, with lateral branches 6 to 8 feet, in August of this year. I will say that my experience in the past five years goes to show that the only thing necessary to the permanent growth of timber is the stopping of the annual fires that devastate this country. On my own place, there has been no destruction by fire since 1871, in consequence of which the native growth of timber on the creek has largely increased, elm, cottonwood, ash, and box-elder springing up from all sides, and making a growth surprisingly rapid, so much that the prospects are that in a very few years there will, on account of the stoppage of fires, be a sufficient amount of natural growth for all necessary farm-purposes. The only drawback that I now see to the culture of timber is the very slack manner in which people plant. Most of the people who set out trees are in the habit of merely digging holes in the ground and setting the tree out, and leaving it surrounded by thousands of acres of dry and unbroken prairie, annually burnt over, and then expect the tree to live. From the continually increasing moisture in the atmosphere, I am inclined to the opinion that but a short period must elapse before all kinds of forest-trees can be successfully cultivated on the plains. At the present time, however, I would only attempt the growing of such as are native, such as ash, walnut, elm, cottonwood, box-elder, and hackberry. A great many experiments have been made with maple, ailantus, poplars, etc., but they require too much care in the start, and for present or early future use it would not be advisable to plant them. It is my intention

to open up a timber-claim next year, and the plan which I have concluded to adopt is as follows:

1st. Break the sod from 1½ to 2 inches in depth and plant to corn; even if no crop is obtained, the spreading of the roots will disintegrate the soil and make it better for the reception of the tree-plants in the spring. I then intend to set out alternately one cottonwood and one ash, elm, or walnut, planting between the 12-foot rows two rows of corn, so that by the working of the corn the trees will be thoroughly cultivated. This can be done for two years, when I expect, from the more rapid growth of trees, to obtain shade enough to prevent the growth of weeds.

While on the subject of timber, allow me to call your attention, and through you the Department of Agriculture, to what I deem a great drawback to the "timber-culture act." In the first place, eight years are required for the perfecting of title, and the heirs alone of the party are entitled to the benefit of his investments. Now, it frequently happens that a party will enter under the act 160 acres of land and perform well and faithfully all the requirements of the law for, say, three or four years, at the expiration of which time other and more advantageous prospects in some other locality may offer themselves; he may have invested several hundred dollars in the cultivation of his claim, or he may have failed in business and not have means sufficient to continue the improvements. Now the law does not allow him to transfer to another party his interests, that is, in such a manner that the party buying will receive the benefit of the time required. If, in my opinion, the law was so changed that after cultivating the land for four or five years and having a valuable growth of timber on it I could transfer to a party not only my timber interests but my time interest, subject to continuance of the cultivation only for my unexpired time, many more people would, I am inclined to think, be willing to invest money in the planting of timber.

Mr. Asa Kinney, of Russell, near the extreme of settlement on the high plains of Western Kansas, writes:

Last fall I planted near a bushel of the peach-pits just as the ground was freezing up; they came up about the middle of May, and the largest of them measures 4 feet 3 inches in length, and 3½ inches around the body near the root. I planted four hundred cottonwood seed last fall, and the largest measures 6 feet and 6 inches in length. These trees were planted on old ground that had been planted and cultivated four years, and have been well tended this season and well hoed, &c. I am satisfied that trees will do well on lands well subdued, and do best when planted in the seed where you design them to grow.

Mr. T. McKitrick writes from Borland, Ellsworth County, Kansas:

I received your letter in regard to tree-growing in our locality, and would say, in regard to tree-growing in Central Kansas, it is hard to tell on the open prairie what trees will do, for the cattle running at large destroy all young trees. But the tree-growing in the experimental garden at Borland has been a success. The trees have done well. Some of them have almost doubled their size this season. There are locust, maple, walnut, ailantus, catalpa, box-elder, osage orange, and a number of other varieties of forest-trees, and all are doing well, but the box-elder appears to be the hardiest of all—they stand the wind better than the other trees, the roots spread more than the rest, which I found in digging some up last spring; they were the firmest in the ground, the roots spreading more. As for fruit-trees, I cannot tell much about. There are some here, and grow very well, but not large enough to bear fruit. Some of the peach-trees bloomed this spring, also some of the cherries and plums.

Mr. C. H. Longstreth, forester to the Atchison, Topeka and Sante Fé Railroad, sends the following statistical statement to Col. A. S. Johnson, acting land commissioner, as an answer to our request for information relative to tree-planting upon that southern and comparatively treeless route:

HUTCHINSON, KANS., *October* 26, 1875.

DEAR SIR: In reply to your request for a statistical report of our success in tree-planting along the line of the Atchison, Topeka and Sante Fé Railroad, I have to say, that we have planted a variety of trees and seeds at four different stations along the line of the said road.

The first experimental station is at Hutchinson, one hundred and eighty miles west of the east line of the State, and 1,500 feet above the sea-level. Soil, a light sandy loam. Trees planted in rows six feet apart and two feet apart in the row, measured in October, 1875, as follows:

Trees planted in spring of 1873—growth of three years.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Silver-maple	1 year old	50 per cent	6 to 9 feet	7 feet	1 to 2 inches.
Box-elder	....do	60 per cent	6 to 8 feet	....do	1 to 2 inches.
Honey-locust	....do	95 per cent	5 to 7 feet	6 feet	1 to 3 inches.
Catalpa	....do	100 per cent	8 to 10 feet	9 feet	2 to 3 inches.
Ailantus	....do	100 per cent	10 to 12 feet	11 feet	2 to 4 inches.
American elm	....do	90 per cent	6 to 8 feet	7 feet	1 to 2 inches.
Silver-poplar	Cuttings	20 per cent	....do	....do	1 to 2 inches.
Cottonwood	....do	25 per cent	16 to 18 feet	17 feet	3 to 4 inches.
Peach	Seed		7 to 8 feet	7½ feet	2 to 3 inches.
Box-elder	....do		7 to 9 feet	8 feet	1 to 2 inches.
Catalpa	....do		....do	....do	1 to 2 inches.
Ailantus	....do		8 to 10 feet	9 feet	2 to 3 inches.
Black walnut	....do		5 to 7 feet	6 feet	1 to 2 inches.
Kentucky coffee	....do		2 to 3 feet	2½ feet	½ to 1 inch.
Ash	....do		4 to 6 feet	5 feet	1 to 1½ inches.

Trees planted in spring of 1874—growth of two years.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Box-elder	1 year old	100 per cent	7 to 9 feet	8 feet	1 to 2 inches.
Ailantus	....do	....do	8 to 10 feet	9 feet	1 to 2 inches.
Cottonwood	Cuttings	60 per cent	10 to 13 feet	11 feet	2 to 3 inches.
Gray willow	....do	20 per cent	6 to 8 feet	7 feet	1 to 2 inches.
Box-elder	Seed		5 to 7 feet	6 feet	½ to 1 inch.
Ailantus	....do		6 to 8 feet	7 feet	1 to 2 inches.
Black walnut	....do		2 to 3 feet	2½ feet	½ to 1 inch.
Burr-oak	....do		6 to 10 inches	8 inches	

Trees planted in spring of 1875—growth of one year.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Cottonwood	1 year old	100 per cent	6 to 9 feet	7 feet	
Ailantus	....do	....do	2 to 4 feet	3 feet	
Cottonwood	Cuttings	60 per cent	6 to 9 feet	7 feet	
Peach	Seed		24 to 36 inches	30 inches	
Ash	....do		12 to 20 inches	15 inches	
Box-elder	....do		20 to 30 inches	25 inches	
Honey-locust	....do		15 to 25 inches	20 inches	
Black walnut	....do		12 to 18 inches	15 inches	
Kentucky coffee	....do		4 to 12 inches	6 inches	
Hackberry	....do		12 to 20 inches	15 inches	
Silver-maple	....do		20 to 30 inches	25 inches	
Catalpa	....do		24 to 36 inches	30 inches	

The second experimental station is at Ellinwood, two hundred and fifteen miles west of the east line of the State. Elevation, 1,760 feet; soil, a black, sandy loam, with stiff clay subsoil. The following table shows the success of the different varieties planted here:

Trees planted in spring of 1873—growth of three years.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Silver-maple	1 year old	80 per cent	7 to 8 feet	7½ feet	1½ to 2½ inches.
Honey-locust	1 year old	100 per cent	6 to 8 feet	7 feet	1 to 2 inches.
Catalpa	1 year old	90 per cent	4 to 6 feet	5 feet	1 to 2½ inches.
Box-elder	1 year old	90 per cent	6 to 9 feet	7 feet	1 to 2 inches.
American elm	1 year old	90 per cent	5 to 7 feet	6 feet	1 to 2 inches.
Cottonwood	Cuttings	50 per cent	11 to 13 feet	12 feet	3 to 4 inches.
Catalpa	Seeds		4 to 6 feet	5 feet	1 to 2 inches.
Box-elder	Seeds		7 to 9 feet	8 feet	1 to 2 inches.
Ailantus	Seeds		8 to 10 feet	9 feet	1 to 2 inches.
Peach	Seeds		5 to 6 feet	5½ feet	1 to 2 inches.
Ash	Seeds		3 to 4 feet	3½ feet	1½ to 1 inch.
Black walnut	Seeds		3 to 5 feet	4 feet	1 to 2 inches.

Trees planted in spring of 1874—growth of two years.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Ailantus	1 year old	90 per cent	5 to 6 feet	5½ feet	1 to 2 inches.
Ash	1 year old	80 per cent	3 to 5 feet	4 feet	1½ to 1 inch.
Cottonwood	Cuttings	60 per cent	7 to 9 feet	8 feet	1 to 2½ inches.
Gray willow	Cuttings	20 per cent	5 to 7 feet	6 feet	1 to 2 inches.
White willow	Cuttings	20 per cent	4 to 5 feet	4½ feet	1 to 2 inches.
Ailanthus	Seed		5 to 7 feet	6 feet	1 to 2 inches.
Osage-orange	Seed		3 to 5 feet	4 feet	½ to 1 inch.
Black walnut	Seed		2 to 3 feet	2½ feet	½ to 1 inch.

Trees planted in spring of 1875—growth of one year.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Box-elder	1 year old	90 per cent	10 to 30 inches	20 inches	
Ailantus	1 year old	100 per cent	3 to 6 feet	4 feet	
Catalpa	1 year old	100 per cent	18 to 36 inches	25 inches	
Honey-locust	1 year old	90 per cent	15 to 30 inches	20 inches	
American elm	1 year old	90 per cent	10 to 20 inches	15 inches	
Peach-seedling	1 year old	100 per cent	18 to 36 inches	24 inches	
Ash	1 year old	100 per cent	6 to 18 inches	10 inches	
Black walnut	Seed		6 to 12 inches	10 inches	
Cottonwood	Cuttings	75 per cent	4 to 6 inches	5 feet	

The third station is at Garfield, two hundred and fifty-six miles west of State line. Elevation, 2,100 feet; soil, light loam, with clay subsoil. Here we did not commence planting until spring of 1874, a year later than at the other stations. The following table shows the success of different varieties planted here:

Trees planted in spring of 1874—growth of two years.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Box-elder	1 year old	100 per cent	4 to 6 feet	5 feet	1 to 2 inches.
Ailantus	1 year old	100 per cent	5 to 6 feet	5½ feet	1 to 2 inches.
Cottonwood	Cuttings	20 per cent	7 to 9 feet	8 feet	1 to 2 inches.
Gray willow	Cuttings	10 per cent	6 to 8 feet	7 feet	1 to 1½ inches.
Box-elder	Seed		5 to 6 feet	5¼ feet	1 to 1½ inches.
Black walnut	Seed		2 to 4 feet	3 feet	1 to 1½ inches.
Ailantus	Seed		4 to 5 feet	4½ feet	1 to 1½ inches.

Trees planted in spring of 1875—growth of one year.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Box-elder	1 year old	100 per cent	12 to 30 inches	24 inches	
American elm	1 year old	90 per cent	6 to 24 inches	18 inches	
Honey-locust	1 year old	80 per cent	6 to 20 inches	15 inches	
Ash	1 year old	75 per cent	6 to 12 inches	9 inches	
Peach	1 year old	100 per cent	12 to 30 inches	24 inches	
Cottonwood	Cuttings	60 per cent	5 to 7 feet	6 feet	
Black walnut	Seed		6 to 12 inches	9 inches	
Catalpa	Seed		6 to 18 inches	12 inches	

The fourth station is at Spearville, two hundred and eighty-three miles west of the State line. Elevation, 2,480 feet; soil, deep, dark loam, with clay subsoil. This place is on the high upland prairie, and is generally known by the name of Dry Ridge. While the growth is not quite so good, the trees lived about as well as at other points farther east, as the following table will show:

Trees planted in spring of 1873—growth of three years.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Silver maple	1 year old	90 per cent	4 to 2 feet	4½ feet	1 to 1½ inches.
Box-elder	1 year old	80 per cent	4 to 6 feet	5 feet	1 to 2 inches.
Honey-locust	1 year old	100 per cent	4 to 5 feet	4½ feet	1 to 1½ inches.
Ailantus	1 year old	100 per cent	4 to 6 feet	5 feet	1 to 2 inches.
Black-walnut	Seed		2 to 3 feet	2½ feet	½ to 1 inch.
Ailantus	Seed		4 to 5 feet	4½ feet	1 to 2 inches.

Trees planted in spring of 1874—growth of two years.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Box-elder	1 year old	90 per cent	4 to 6 feet	5 feet	1 to 2 inches.
Ailantus	1 year old	100 per cent	2 to 4 feet	3 feet	1 to 2 inches.
Ash	1 year old	50 per cent	1 to 2 feet	1½ feet	½ to 1 inch.
Black walnut	Seed		1 to 2 feet	1½ feet	½ to 1 inch.
Box-elder	Seed		3 to 5 feet	4 feet	½ to 1 inch.

Trees planted in spring of 1875—growth of one year.

Name of tree.	Age at time of planting.	Proportion living.	Extremes of height.	Average height.	Diameter in inches.
Ailantus	1 year old	100 per cent	12 to 30 inches	24 inches	
Honey-locust	1 year old	90 per cent	6 to 15 inches	12 inches	
American elm	1 year old	75 per cent	3 to 12 inches	9 inches	
Peach	1 year old	80 per cent	10 to 30 inches	20 inches	
Box-elder	1 year old	80 per cent	12 to 36 inches	24 inches	
Ash	1 year old	75 per cent	3 to 12 inches	6 inches	
Black walnut	Seed		6 to 12 inches	9 inches	

Considering that all our planting, the first year, was on newly-broken sod, and having the devastating army of grasshoppers the second year (1874) to contend with, I think the success of our work will compare favorably with forest-tree planting in other parts of the country.

Yours, respectfully,

C. H. LONGSTRETH,
Forester for Atchison, Topeka, and Sante Fé Railroad Company.

TIMBER-PLANTING IN NEBRASKA.—This State has encouraged tree-planting by several legislative enactments. In 1871, corporate authorities of cities were required to cause shade-trees to be planted; and a tax of from one to five dollars was placed upon each lot for the purpose, from which the owner was exempt by planting trees of the prescribed size and distance apart along the street. In 1872 an enactment exempted from taxation for five years $100 of the valuation of the property of any tax for each acre planted and cultivated in forest-trees. The trees were required to be set not more than 12 feet apart, and the exemption was limited to $500 for five acres upon a property not exceeding 160 acres.

The Burlington and Missouri River Railroad, in Southern Nebraska, has found it desirable, as a protection of the road, and to illustrate the capabilities of the country, to undertake systematic experiments in tree-planting. Mr. A. E. Touzalin, the land-commissioner of that road, has forwarded these operations enthusiastically, and has been able to report very successful beginnings of tree-planting along the line of that road.

It was apparent to all from the presence of wood along the streams, among the bluffs, and the flourishing groves and shelter-belts that em-

bellish the farm-lands, that climatic conditions were not adverse to arboriculture in Nebraska. In 1872 the road initiated its experiments on the highest and driest section of its line. From Crete, in the Big Blue Valley, to Kearney, in the Platte Valley, the road avoids the bottoms and runs across the table-land, or "divide." It was thought that if Nebraska presented anywhere obstacles to arboriculture, they would surely occur here. In October, 1875, Mr. E. T. Stephens, of Crete, the forester, reported to the land-commissioner:

The tree-planting and cultivation which I have carried out under the instructions of the superintendent of the road, was commenced in the summer of 1872. I had to plant the north sides of the shallow cuttings from Crete to Kearney, and at one or two points east of Crete. The ground broken comprised 186.4 acres, and the length of the several plats was twenty-eight and one-half miles. I had the sod-breaking done in the summer, and that fall (the fall of 1872) the ground was stirred double depths by running one plow behind another in the same furrow. The tree-planting was commenced on March 28, 1873. The plan adopted was to set out the trees in rows, seven of them, the north row being 99 feet from the center of track, and the space between each row being 7 feet. In the northernmost row, honey-locust was put in the ground for an outside hedge; and the other six rows were: 1, soft maple and box-elder; 2 and 3, white willow and cottonwood cuttings, and laurel-leaved willow, sugar-maple, soft-maple, box-elder, white elm, &c.; 4, Norway spruce and Scotch pine; and 5 and 6, European larch. In addition, fruit-trees were planted near the towns and section-houses. The trees and cuttings made a total of 460,000; of which 45,000 were pine and spruce, 70,000 larch, 65,000 soft maple, 11,000 box-elder, and 20,000 ash; and the planting of the spruce, pine, and larch was 4 feet apart in the row; of the maples, elms, &c., 2 feet, and, of the cuttings, 1 foot. The ground was cultivated three times that summer; and, on an examination being made in the fall, it was found that the trees presented the following percentages of vigorous and thrifty life: ash, 98⅗ per cent.; honey-locust and box-elder, 92 per cent.; soft maple, 88 per cent.; European larch, 82¼ per cent.; Norway spruce and Scotch pine, 80 per cent.; and willow and cottonwood cuttings, 75 per cent. Part of the loss here shown I attribute to the raw and unfavorable quality of the soil. The planting was done at tops of cuts, where the clay taken from the road-bed, below the soil, had been thrown, and this clay slacked down, and left the roots exposed. This was bad for the young trees; but still 95 per cent. of the evergreens (not merely 80 per cent.) would have thrived had it not been for 8,000 Norway spruce, which, never having been transplanted, were too weak for the raw soil and exposed situation. I have no hesitation in making this statement, for, in the unfavorable situations, transplanted and root-pruned spruce and pine showed a percentage living of 98. In the spring of 1874, the vacancies were filled with one-year-old green ash, native to the country; but, the season being unfavorable, there was some loss. This year, however, the plantings have made good growth, and in many of the groves the trees are thick enough and tall enough to serve as snow-breaks, and the honey-locust hedge, which has been cut back twice to make it thicken up, is 5 feet high, and promises to be a good fence. Our experience is encouraging; but I believe it would have been still greater if only native trees had been planted. These rows of trees along the cuttings are the same as wind-breaks about the farm; and the best trees for this purpose are: on the outside, willow and cottonwood; and inside, walnut, ash, and box-elder. For planting in groves about the house, and inside the wind-breaks, the experience I have had shows evergreens to be reliable growers. In my grounds I have 3,000, and I find them to be as easily managed as deciduous trees, and the percentage of loss very small. I have more than two miles of osage orange and honey-locust hedge about my farm, and I am satisfied these two plants will make good hedge-plants in Nebraska. So far as my experience goes, the wood of the fruit and forest trees planted this season in Nebraska has ripened well, and the young trees promise to pass the winter safely. Apple-trees this year have made a growth of 2 to 5 feet.

Mr. Touzalin appends to the foregoing report a list of the trees and shrubs native to Nebraska. It is commonly imagined that the sylva of the prairie is scanty; but the idea is a mistaken one, as the list will demonstrate. The trees noted have been observed by Samuel Aughey, M. A., Ph. D., professor of chemistry and natural science at the State University, who has spent many years in Nebraska, and has rendered the State good service by his patient and painstaking scientific explorations in the country.

TREES.—Ohio buckeye, *Æsculus glabra;* sweet buckeye, *Æ. flava;*

red maple, *Acer rubrum;* sugar maple, *A. saccharinum;* box-elder, or ash-leaved maple, *Negundo aceroides;* honey-locust, *Gleditschia triacanthus;* water-locust, *G. monosperma;* coffee-tree, *Gymnogladus Canadensis;* white ash, *Fraxinus Americana;* green ash, *F. viridis;* blue ash, *F. quadrangulata;* red elm, *Ulmus fulva;* white elm, *U. Americana;* cork-elm, *U. racemosa;* wahoo elm, *U. alata;* hackberry, *Celtis occidentalis;* plane-tree, or sycamore, *Platanus occidentalis;* black walnut, *Juglans nigra;* shagbark hickory, *Carya alba;* *C. tomentosa;* pignut hickory, *C. porcina;* bitternut hickory, *C. amara;* oak, (11 species,) *Quercus;* iron-wood, *Carpinus Americana;* paper-birch, *Betula papyracea*, and two other birches, *B. pumila* and *B. occidentalis;* willow, *Salix*, of which there are four tree-species and eight shrubs; water-poplar, *Populus angulata;* cottonwood poplar, *P. monilifera;* balsam-poplar, *P. balsamifera* var. *candicans;* yellow pine, *Pinus ponderosa;* white cedar, *Cupresses thyoides;* red cedar, *Juniperus Virginiana;* and two species of spruce fir, *Abies Engelmanni*, and *A. Douglasii.*

SHRUBS.—Common juniper, *Juniperus communis;* linden, *Tilia Americana* var. *pubescens;* prickly ash, *Zanthoxylum Americanum;* shrub trefoil, *Ptelea trifoliata;* papaw, *Asimina triloba;* five sumacs, *Rhus typhina, R. glabra, R. copallina, R. Toxicodendron*, and *R. aromatica;* buckthorn, *Rhamnus alnifolius;* red root, *Ceanothus Americanus*, and also *C. ovalis;* spindle-tree, three species, *Euonymus atropurpureus, U. Americanus*, and *U. ovalis;* six species of plum, *Prunus Americana, P. chicasa, P. pumila, P. Pennsylvanica, P. Virginiana*, and *P. serotina;* currants and gooseberries, *Ribes cynosbati*, and five other species; blackberries and raspberries, *Rubus*, four species; butterbush, *Cephalanthus occidentalis;* five dogwoods, *Cornus Canadensis, C. circinata, C. sericea, C. stolonifera*, and *C. asperifolia;* two species buffalo-berry, *Shepherdia canadensis* and *S. argentia;* red mulberry, *Morus rufra;* white mulberry, *M. alba;* hazel-nut, *Corylus Americana;* and beaked hazelnut, *C. rostrata.*

This list will make it evident that the sylva of Nebraska is not of a trivial character, but includes many trees of highest use in the arts. In the list the shrubs are separated from the trees, sometimes by an indefinite line, for some of the shrubs are tree-like in form, and reach a height of 15 to 20 feet. It is very possible, as Mr. Stephens suggests, that our tree-planters would succeed best if they selected the most useful of the native trees for planting, having regard, of course, to all the facts—rapidity of growth as well as the solidity of the wood. Keeping in view the idea of utility, the best trees are the native pines, the green ash, black walnut, the elms, hickories, and maples, the poplars, and the honey-locust. The pines are here inserted, for, though slow of growth, it is desirable that they should be planted; and also the oaks—slow as these are, and therefore not *en rapport* with the rapid western notions—ought to be grown. Years must elapse before the general aspect of a country can be changed by cultivation; but the processes which will effect the change, and make Nebraska a wooded country, are going on. Year after year trees are being planted by millions; and, though in the early days of settlement much timber was necessarily cut from the creek-sides, the waste is now more than restored by tree-planting; and in the coming days Nebraska will produce lumber enough for her own needs, and have to spare for export.

MINNESOTA.—The secretary of the State Forestry Association of Minnesota, Mr. Leonard B. Hedges, says that more than a million of forest-trees were planted in that State on Arbor Day, in 1875, under the stimulus of less than four hundred dollars offered in premiums before the organization of the association, which proposes to make the work sys-

tematic and general. He makes the following estimate of the supply of the Northwest:

We have probably 9,000,000 acres of fair average forest in Minnesota. If our present condition remains unchanged, our supply is good for about sixty years; but if we as a State keep step with the advance of civilization, there are persons in this room who will live to see our present supply completely exhausted unless the supply is renewed by artificial planting. If 600,000 people require 150,000 acres annually, 1,200,000 would require 300,000 acres annually, which would exhaust the present supply within the probable life-time of any young man just striking out for himself.

Wisconsin is destroying her forests at an equally rapid rate. Fifty thousand acres of Wisconsin forests are cut annually to supply the Kansas and Nebraska trade alone. Ten thousand acres of forests go into the stoves and furnaces of Chicago every year.

He estimates the cost of planting forty acres under the provisions of the United States timber act of 1874 as follows:

Breaking 40 acres, $3 per acre	$120 00
Cross-plowing, $2 per acre	80 00
Harrowing	28 00
Marking out	12 00
Cost of 12,000 trees	24 00
Cost of planting 12,000 trees	36 00
	300 00
Cultivation for eight years	200 00
Total cost	500 00

ILLINOIS UNIVERSITY.—The following is an extract from a report of the department of horticulture in the Illinois University:

Twenty acres are set apart for an experimental forest-tree plantation in the grounds of the university, and planted with green ash, white ash, catalpa, chestnut, white elm, European larch, white maple, osage orange, Austrian pine, Scotch pine, white walnut, white willow, white pine, Norway spruce, and sugar-maple. They are planted 2 by 4 feet apart, except the pines, which are 4 by 4 feet. This closeness of planting is deemed essential to secure an upright and regular growth. The chestnuts have been a complete failure. A few left in the nursery and protected by other trees are doing well. The larvæ of the May beetle seriously injured them in the plantation. The European larch, so far, have not been satisfactory. They, too, were injured by the May beetle larvæ. These, especially, need to be planted close together, for while young they tend to spread. They are succeeding better upon the dryest land. The catalpa has made the last year the greatest growth, averaging 4 feet. Next in order are the white maple, osage, and willow, each averaging 3 feet in growth; the green and white ash, 2 feet 6 inches, and the elm and walnut each 2 feet; the others are less. The catalpa was very little injured by the severe winter of 1872 and 1873, though the thermometer marked 30° below zero. It is the only kind of which none have died. It is also one of the cheapest, and is noted for the durability of its wood. The white ash and osage orange are also among the cheapest, and are easily propagated and safely transplanted, while both are highly valuable as timber-trees. The total number of trees planted is 53,576, and the total cost $1,199.04.

Mr. H. K. Vickroy, in charge of forest-planting at the university, has made the following statement of the cost of planting and cultivation of the different kinds of trees:

Species.	Original actual cost.	Planting and cultivation.	Total cost per acre.	Species.	Original actual cost.	Planting and cultivation.	Total cost per acre.
Ash, green	$80 00	$91 48	$171 48	Osage, orange	$10 88	$51 08	$61 96
Ash, white	10 70	32 14	42 84	Pine, Austrian	220 00	82 26	302 26
Catalpa, (from seed)	4 00	47 30	51 30	Pine, Scotch	200 00	60 76	260 76
Elm, white	24 00	92 12	116 12	Walnut, white	38 06	60 74	98 82
Chestnut	120 00	65 96	185 96	Willow, white	5 44	63 06	68 50
Larch, European	64 00	33 47	97 47	Pine, white	10 88	10 88	30 80
Maple, white	65 28	85 52	150 80	Spruce, Norway	59 88	86 28	146 16

Mr. Vickroy writes that many of these trees were handled in the nursery several times before it was decided where to plant them, making them unnecessarily expensive. The cost was also increased by the large size of many of them. He thinks that the rate of cost can be reduced one-third from the above figures, under favorable circumstances.

He planted, in 1871, 7 acres with 14 species of forest-trees, comprising 36,749 trees of one, two, and three years of age, and in 1872, 1¼ acres more with 4,083 trees, making a total of 40,832 trees, or, including 4,000 larch, 1,000 Austrian and 1,000 Scotch pine replanted, 46,832 trees. All the trees, except the evergreens, were planted 2 by 4 feet, or 5,444 trees to the acre. The evergreens were planted 4 by 4 feet, or 2,722 trees to the acre. The following table gives the species planted, the number of trees of each, the percentage living, and the average growth of the trees planted in the first year:

Species.	Number of trees.	Per cent. living.	Growth, inches.	Species.	Number of trees.	Per cent. living.	Growth, inches.
Ash, green	1,360	98	6	Osage-orange	1,361	98	24
Ash, white	14,974	95	6	Pine, Austrian	680	2	....
Catalpa	1,361	100	12	Pine, Scotch	680	2	....
Elm, white	680	100	12	Walnut, white	1,361	99	6
Chestnut	1,361	50	6	Willow, white	1,361	98	24
Larch, European	10,890	25	6	Pine, white, (1872)	2,722	20	3
Maple, white	680	98	12	Spruce, Norway	1,361	98	3

The catalpa, white elm, white walnut, green ash, white maple, osage-orange, white willow, and Norway spruce were not diminished in numbers to exceed 2 per cent., although most of them were planted in the very dry season of 1871; but the Austrian and Scotch pines, chestnut, and European larch made a poor showing. The osage-orange and white willow made the best growth.

IOWA.—Mr. H. H. McAffee, of the Iowa Agricultural College, now secretary of the American Forestry Association, gives the following as results obtained in twenty years with trees named below:

	Diameter of trunk, inches.	Height in feet.	Cord feet in fuel.		Diameter of trunk, inches.	Height in feet.	Cord feet in fuel.
Cottonwood, (*monilifera*)	24	50	5¼	Maple, (*dasycarpum*)	18	39	3¼
Cottonwood, (*quadrangulata*)	28	50	6	Maple, (*niger*)	11	37	1
Lombardy poplar	23	60	4¼	Walnut, (*cinerea*)	20	38	3¼
Elm, (*Americana*)	17	44	3¼	Walnut, (*niger*)	14	37	2¼
Elm, (*fulva*)	18	39	3	Honey-locust	14	40	3
				German pine	14	33	2

OHIO.—Mr. Daniel Milliken, of Hamilton, who has thought earnestly and written instructively upon this subject, attests the profit of cultivated timber in that country of forests not subdued. He says that forests are being stripped of young growths, even in districts where cord-wood is only worth the cost of cutting, and notes the fact that a lot of 10 acres near Piqua, eighty years ago cleared by General Wayne to avoid surprise by the Indians, yielded, of selected hickory, ash, and elm, logs limited to within the limit of 6 and 10 inches in diameter, 25,000 linear feet, which brought, at 9 cents per foot, $2,250.

CALIFORNIA.—Tree-planting in California is receiving much attention

at present. An individual instance or two will show the extent of such efforts. Mr. James T. Stratton, of Brooklyn, has planted the *Eucalyptus globulus* very extensively. With reference to his plantation at Haywood, Alameda County, he writes to this Department:

I began the enterprise in the spring of 1869 by planting 48 acres of blue-gums, (*E. globulus,*) and about 7 acres of red-gums, (botanical variety not determined,) numbering about 34,000, being planted in rows 8 feet each way. The largest of these blue-gums are now (January, 1876,) 18 inches in diameter and 70 feet high, but are generally about 10 inches in diameter and 60 feet high, while the red-gums are about 6 inches in diameter and 50 feet high. I have added yearly to the plantation, until I have now 195 acres, (about 130,000 trees, part planted 8 by 6 feet apart,) 165 of which is *E. globulus*, which is much the fastest grower of that family, while the remaining 30 acres are about equally divided between the red variety above named and another red-gum, (*E. tereticornis*), iron-bark gum, (*E. paniculata,*) box, (*E. hemiphloia,*) and stringy-bark, (*E. obliqua.*) These latter varieties were reported to me by a correspondent in New South Wales as being the most valuable of the 120 different varieties of that family of Australian forest-growth. I find that they are very slow growers, making not more than one-fourth of the growth of the blue-gums.

All of the different varieties that have been introduced into this State are pre-eminently dry-land trees, and will not thrive on low grounds or where the water stands at the surface, even in mid-winter; and therefore I am much surprised to see newspaper accounts of their adaptation to swampy localities, and that swamps have been reclaimed by them in Italy, Algeria, and Southern Spain. I have experimented extensively with them, and observed them wherever grown, in every variety of soil and location, and am constrained to believe that some other tree is referred to.

The wood of the blue-gum is white, about as hard but a little stronger than the best eastern ash, and a stick 1 inch square on bearings 30 inches apart will sustain on a counter-point 280 to 300 pounds without breaking; and therefore I am satisfied that it will be considered a very valuable timber for mechanical uses. It is durable only when kept dry, while the red and iron-bark gums are very durable in the ground; and my correspondent informs me that he has seen perfectly sound specimens that he was assured had been in the foundation of a dwelling at least one hundred years, and I have a little confirmation of his statement in an experiment I have made, in which a board of red-gum, 6 inches wide, 1 inch thick, California-grown, showed not the slightest indication of decay after being set in the ground three years. Those varieties will, therefore, be invaluable for railroad-ties, fence-posts, &c., and for every use where strength and durability are required.

There is a thrifty forest of *Eucalyptus* trees on the line of the railroad between Los Angeles and Anaheim, in Southern California. It is owned by a company of which Judge Widney is president. The company owns 200 acres of fine land, on which are houses and other improvements. About 140 acres have been set out in *Eucalyptus*, containing about 80,000 trees. Of these, some 30,000 are from 8 to 15 feet high. The total cost up to January 1, 1876, including purchase of land, is $12,523. The estimated expense for the first year, prior to incorporating the company, was $12,750, which exceeded the actual outlay. Disinterested persons estimate the present value at from $40,000 to $60,000. The remaining 60 acres will be set out about the 5th of May, after which time the expenses will be but little. When the enterprise was started Widney estimated the total cost for four years at $18,000 to $20,000, or 20 per cent. of the capital stock. He now estimates that the total cost will not exceed $16,000 to $18,000, or 16 to 18 per cent. on the capital stock. At the end of four years the property cannot be worth less than $100,000.

STATISTICS OF CONSUMPTION.

CALIFORNIA.—The timber-consumption of San Francisco and the western part of California is increasingly heavy. Pope & Talbot, of San Francisco, a firm well acquainted with the statistics and tendencies of the lumber-trade of the western coast, report as received in 1874

from Washington Territory, Oregon, and the California coast, 253,251,063 feet, and in 1873, 203,329,441 feet, besides shingles, laths, posts, ties, spars, and other miscellaneous products.

The sources of supply of the different kinds of timber are as follows: "Puget Sound or Oregon pine," 2 or 3 per cent. from the California coast, 10 per cent. from Oregon, and the remainder from Washington Territory. Spruce: 40 per cent. from California, 50 from Oregon, 10 from Washington. White cedar: nearly all from Coos Bay, Oregon. Red cedar is beginning to come in from Washington. The red-wood is all from the California coast, and the laurel mainly. The "hard wood" comes from Oregon, but there is nothing that would be called hard wood on the Atlantic coast. Sugar-pine is obtained principally from the headwaters of the Sacramento River. There is a small portion that comes from the Sierra Nevada Mountains.

Piles, ship-knees, poles, bowsprits, &c., are from Washington. Spanish cedar and rosewood are brought from Central America. In addition to the shipments to California, about 30,000,000 feet of lumber is shipped from Washington and 20,000,000 feet from Oregon and California ports to the southern coast of California and foreign countries.

The following is a recapitulation of the lumber received in San Francisco in 1874:

Puget Sound and Oregon pine:		
Rough, feet	109,960,737	
Dressed, feet	15,260,932	
Fencing, feet	14,419,775	
Pickets, feet	215,542	
		139,856,986
Spruce:		
Rough, feet	11,866,163	
Dressed, feet	765,690	
		12,631,853
Cedar:		
Rough, feet		3,144,343
Maple, oak, ash, and cottonwood, feet		188,856
Red-wood:		
Rough, feet	47,715,249	
Rough, clear, feet	5,122,217	
Dressed, clear, feet	33,473,409	
		86,310,875
Red-wood:		
Dressed, ½-inch, feet	230,730	
Siding, ½-inch, feet	1,276,942	
Battens, ½-inch, feet	531,620	
		B. M. 1,019,646
Pickets:		
Rough, feet	1,262,405	
Dressed, feet	616,567	
		1,878,972
Railroad-ties, feet	2,558,614	
Telegraph-poles, feet	557,913	
		3,116,527
Sugar-pine, rough, feet		5,103,005
Total feet		253,251,063
Total feet same time in 1873		203,329,441

Sundries.

Shingles	70,431,250
Laths	42,229,100
Piles, linear feet	555,583
Ship-knees, pieces	2,048
Red-wood posts	789,046
Railroad-ties, rift, pieces	226,019
Broom-handles, pieces	397,863

Ship-spars, linear feet	3,296
Ship-spars, pieces	223
Poles, linear feet	58,963
Poles, pieces	18
Bowsprit, pieces	4
Spanish cedar-logs, pieces	9,070
Primevera logs, pieces	837
Lignumvitæ logs, pieces	90
Tamana logs, pieces	20
Rosewood logs, pieces	9

Statement of receipts of lumber at San Francisco during the year 1875.

Pine:		
Rough, feet	130,829,672	
Dressed, feet	19,744,325	
Fencing, feet	12,778,500	
Pickets, feet	342,929	
		163,695,426
Spruce:		
Rough, feet	11,400,653	
Dressed, feet	953,917	
		12,354,570
Cedar:		
Rough, feet		7,730,400
Hard-wood, feet		154,040
Red-wood:		
Rough, feet	56,795,106	
Clear, feet	6,574,278	
Dressed, feet	45,741,981	
		109,111,365
Red-wood:		
Dressed, ½-inch, feet	479,192	
Sidings, ½-inch, feet	1,345,059	
Battens, ½-inch, feet	579,060	
	B. M.	1,201,655
Pickets:		
Rough, feet	1,160,006	
Dressed, feet	604,110	
		1,764,116
Railroad-ties, feet	3,399,211	
Telegraph-poles, feet	688,415	
		4,087,626
Sugar-pine, rough, feet		6,225,000
Total feet		306,324,198

Sundries.

Shingles	104,930,000
Laths	56,006,500
Ship-knees	2,096
Piles, linear feet	593,287
Spars, linear feet	3,543
Spars, pieces	152
Poles, pieces	200
Bowsprit, pieces	5
Railroad-ties, rift, pieces	405,447
Red-wood posts	598,905
Broom-handles, pieces	577,354
Spanish cedar-logs, pieces	6,779
Spanish cedar-logs, feet	42,000
Primevera logs, pieces	1,684
Ebony logs, pieces	146
Rosewood logs, pieces	9

Mr. B. B. Redding, of the land-department of the Central Pacific Railroad Company, communicates from San Francisco the following:

So far as I am aware, but trifling effort has been made toward the culture of forest-trees, except one or two plantations of the *Eucalyptus*, the seeds of which have been imported from Australia. This tree grows with wonderful rapidity in all parts of the State, in both dry and moist soils; in fact, in any soil that is not too wet, and in all

places where the thermometer in winter does not fall below 30°. Some few plantations have been made of the locust, which grows vigorously everywhere on bottom-land, and a commencement has been made for its use for wagon purposes. Many of the varieties of the *Eucalyptus* are supposed to be valuable for commercial purposes, and it is hoped, in time, that it can be used for fencing and fuel in our vast timberless plains.

We have large tracts of the sugar-pine and yellow pine, as well as a species of fir, in the Sierra Nevada Mountains, also a variety of larch, which grows in the most elevated parts of these mountains, which are extensively used for mining-timber. The State of Nevada, and a portion of Utah, are principally supplied from the yellow pine which grows on the eastern slope of the Sierra Nevada. There are fourteen saw-mills on the Truckee River alone, which have sawed an average of 60,000,000 feet of timber per year for the past seven years, as a portion of the supply of the State of Nevada and Territory of Utah. Probably other mills on the borders of Lake Tahoe and at other points furnish an equal amount yearly. It is also estimated that, in addition to this, there are 50,000,000 feet of hewn timber used in the mines of the Comstock lode annually. It would be safe to say that from the eastern slope of the Sierra Nevada there is taken annually 200,000 cords of wood, consumed by the mills on the Comstock lode.

I have no statistics of the consumption of wood on the western slope of the Sierra Nevada, but it is estimated by mill-men that the consumption of wood and lumber from the western slope of the Sierra Nevada, for the supply of towns, in buildings, fencings, &c., and for fuel, must be twice as much as on the eastern slope. The forest-trees fit to be manufactured into mining-timber and into lumber, as well as the oaks for fuel, within many miles of the Central Pacific Railroad, are rapidly disappearing, and no effort is making to renew them.

Timber, from apparently the most inaccessible places in the Sierra Nevada Mountains, is transported in vast quantities, (in some cases for a distance of twenty or thirty miles,) by means of a Californian invention called a V flume. Wherever a small stream of water can be found in the vicinity of a forest a flume of boards, made in the shape of the letter V, is conducted down the mountain-side to a railroad, or to mills, and into this the stream of water is turned, logs, lumber, and firewood thrown in, when the water transports it, with but little care or attention, to its point of destination. No effort is made to renew these forests, and on the western slope of the Sierra Nevada, perhaps, no effort is necessary, for the reason that, when the forests are cut off, young trees of the same character spring up immediately. In the vicinity of Grass Valley and Nevada, in Nevada County, where the trees, for mining purposes, were cut away fifteen or twenty years since, new forests of the same kind of pine have grown up, trees much thicker than they originally stood, and many of these trees are now sufficiently large for mining and mill purposes.

On the eastern slope of the Sierra Nevada, however, where the forests are cut down, new trees do not come up to supply their place, showing, I think, that a different climatic condition existed at the time these forests originated from that which exists at the present time. A theory has been suggested that a few hundred years since the Colorado River emptied into the great basin of what is known as Death Valley, in San Diego County, and that, through Death Valley, it communicated with the ocean. Surveys show Death Valley, for a distance of about two hundred miles long by nearly one hundred wide, to be below the level of the ocean, and the water from the ocean now is only prevented from flowing into it by large bodies of drifting sand, near the head of the Gulf of California, and the Colorado River now seeks another outlet than that through Death Valley. On this vast tract it rarely, if ever, rains. The moisture coming from the ocean is dissipated by the reflected heat from this desert. When the Colorado River flowed into this valley, and mingled with the waters of the ocean, it was evaporating moisture, which, without doubt, had an effect upon the climate of the western slope of the Sierra Nevada; for the prevailing trade-winds of this coast would pass directly over this interior basin, along the eastern slope of the Sierra Nevada.

But little effort is made to prevent the destruction of timber in the Sierra Nevada Mountains.

The sugar-pine is very valuable, and is used for a great variety of purposes. It is our most valuable wood for the interior finish of houses, and it is also used for staves, and occupies the place on this coast that the white pine of Maine and Canada does in the Atlantic States. It rarely grows in groves, but is found scattered among the forests of other species of pine. It splits freely, and is used as shakes for the coverings of houses and for shingles, and extensively for stave-bolts for barrels and casks. Immense quantities are destroyed by men known as "shake-makers," who cut down trees 6 feet in diameter for the purpose of getting one or two cuts for shakes, say 4 feet long, and allow the remainder of the tree to decay on the ground.

The Land Department at Washington does but little to prevent the destruction of our forests. It is rarely that a man is arrested for cutting timber upon Government land. A system has grown up, under the rules of the Land Department, by which one

or two men are allowed to file an affidavit in the local land-office that a certain tract of land (it may be a township or more) is more valuable for mineral than agricultural purposes. This simple affidavit withdraws the land from pre-emption until after long and expensive litigation. Settlers are deterred from settling on it by reason of these affidavits; the land occupies an anomalous position; it is neither under the care of settlers nor the Government, and remains in this condition until all the timber and wood is stolen and sold, when, if settlers see fit to pre-empt it, no further opposition is made to their showing that it does not contain mineral. The land cannot be sold, except as mineral land, while the mineral affidavits are against it. The settlers cannot afford to go into litigation necessary to disprove the mineral. In the mean time the loggers and shake-makers strip it of its timber, and the Government derives no benefit, while the people are demoralized, so that in many places no ownership anywhere is recognized in land containing forest-trees fitted for lumber or wood purposes.

I know of no remedy for this condition of things, as legislation and the Land Department favor the mineral rather than the agriculturist in all that region, which the Land Department, by an arbitrary rule, has been pleased to denominate the "mineral belt."

I have neglected to say anything of the red-wood which grows within the influence of the fogs of the ocean, on the Coast Range Mountains; large quantities of which are consumed in San Francisco and on the coast for building and fencing purposes. It is a very valuable timber, and, in a great many places, young trees come quickly after the forests have been cut down.

LUMBER TRADE OF CHICAGO.

	Receipts.	Shipments.	Estimated value. Receipts.	Estimated value. Shipments.
Lumber ....feet..	1, 147, 193, 423	628, 485, 014	$11, 471, 934	$6, 284, 850
Shingles ....number..	635, 708, 120	299, 426, 936	1, 430, 443	516, 110
Lath ....M feet..	82, 838	26, 509	124, 257	39, 763
Total	....	....	13, 036, 634	6, 840, 723

LUMBER TRADE OF SAINT LOUIS.

Receipts.—White pine, 98,681,880 feet; yellow pine, 21,326,850 feet; poplar, 6,645,000 feet; hard woods, (oak, ash, &c.,) 12,474,500 feet; cedar, 2,729,090 feet. Total, 141,857,320 feet. Shipments, 36,643,000 feet.

Trade of the last three years.

	Stock at the opening of the year.	Receipts during the year.	Sales during the year.
1873.			
White pine ....feet..	97, 612, 000	151, 253, 000	99, 143, 533
Yellow pine ....feet..	5, 993, 799	23, 340, 050	24, 911, 235
Poplar and hard woods ....feet..	5, 400, 000	24, 281, 500	16, 612, 631
Total	109, 005, 799	198, 874, 550	140, 777, 399
1874.			
White pine ....feet..	149, 721, 467	90, 495, 000	103, 239, 569
Yellow pine ....feet..	4, 422, 564	24, 319, 000	23, 934, 720
Poplar and hard woods ....feet..	13, 068, 369	21, 285, 000	22, 363, 527
Total	167, 212, 400	136, 099, 000	149, 533, 816
1875.			
White pine ....feet..	136, 976, 898	98, 681, 880	132, 666, 885
Yellow pine ....feet..	4, 806, 844	21, 326, 850	19, 768, 498
Poplar and hard woods ....feet..	11, 989, 842	19, 119, 509	19, 195, 760
Total	153, 773, 584	139, 128, 239	171, 631, 243
1876.			
White pine ....feet..	102, 991, 893	....	....
Yellow pine ....feet..	6, 365, 196	....	....
Poplar and hard woods ....feet..	7, 372, 636	....	....
Total	116, 729, 725	....	....

LUMBER TRADE OF CINCINNATI.

Commercial years ending August 31—	Imports.	
	Square feet.	Value.
1871-'72	88, 400, 000	$3, 417, 000
1872-'73	98, 000, 000	3, 570, 080
1873-'74	71, 000, 000	2, 331, 600
1874-'75	80, 000, 000	2, 019, 350

LUMBER STATISTICS FROM THE CENSUS.

The ninth census gives an array of statistics that gives a hint of the magnitude of the lumber interest, while failing utterly to show just how large an industry it is. Not all the lumber of local commerce and manufactures enters the census record, and an immense quantity is used upon farms and in small manufactures not reported in the census. The census aggregates are:

Laths	1, 295, 091, 000
Lumber	12, 755, 543, 000
Shingles	3, 265, 516, 000
Staves, headings, &c., (value)	$10, 473, 681
All products, (1870)	210, 159, 327
In 1860 the products were	96, 715, 857

The distribution of this timber is shown as follows:

States and Territories.	Laths.	Lumber.	Shingles.
	Thousand.	*Thousand feet.*	*Thousand.*
Alabama	1, 115	97, 192	1, 422
Arizona		1, 200	
Arkansas	2, 200	78, 692	4, 747
California	2, 877	318, 817	103, 547
Colorado	2, 710	13, 625	3, 675
Connecticut	813	56, 482	15, 510
Dakota		3, 894	
Delaware	100	18, 858	
Florida	1, 400	158, 524	
Georgia	1, 883	245, 141	1, 560
Idaho		1, 490	400
Illinois	13, 650	245, 910	40, 928
Indiana	11, 202	656, 400	73, 707
Iowa	47, 884	325, 285	97, 928
Kansas	320	74, 163	12, 108
Kentucky	8, 050	214, 044	13, 573
Louisiana	8	76, 459	
Maine	266, 889	639, 167	364, 201
Maryland	5, 849	96, 165	3, 860
Massachusetts	873	197, 377	36, 486
Michigan	304, 054	2, 251, 613	658, 741
Minnesota	49, 768	242, 390	137, 813
Mississippi	651	160, 584	5, 500
Missouri	12, 970	329, 676	10, 442
Montana	400	12, 571	2, 356
Nebraska		13, 824	900
Nevada	75	35, 025	700
New Hampshire	10, 383	253, 434	52, 225
New Jersey	3, 167	101, 829	3, 634
New Mexico		6, 909	
New York	87, 999	1, 310, 066	372, 183
North Carolina	1, 530	124, 938	13, 187
Ohio	15, 238	557, 237	59, 632
Oregon	7, 346	75, 193	
Pennsylvania	95, 592	1, 629, 631	275, 273
Rhode Island		12, 732	5, 119
South Carolina	2, 500	95, 098	1, 200
Tennessee	5, 370	204, 751	11, 337
Texas	623	106, 897	30, 209
Utah	1, 138	11, 741	8, 061
Vermont	6, 672	241, 687	28, 502
Virginia	4, 258	144, 225	614
Washington	17, 000	128, 743	10, 450
West Virginia	197, 871	76, 375	5, 600
Wisconsin	102, 663	1, 098, 199	866, 807
Wyoming		3, 260	750
Total	1, 295, 091	12, 755, 543	3, 265, 516

The last census reports 63,928 establishments manufacturing articles made entirely from wood, employing 393,383 persons, and using materials worth $309,921,403 annually; and 109,512 industries in which wood is an important part, as for example carriages, furniture, bridges, ships, &c., employing 700,915 persons, and using materials worth $488,530,844. The details are as follows:

Manufactures.	Number of establishments.	Persons employed.	Value of materials.
Bark, ground	33	133	$194, 491
Baskets	127	920	158, 109
Bee-hives	15	33	8, 459
Boxes, cheese	194	694	242, 937
cigar	104	783	477, 499
packing	489	4, 509	4, 236, 745
Cooperage	4, 961	23, 314	12, 831, 796
Hubs, spokes, wheels, &c	302	3, 721	2, 204, 713
Kindling-wood	70	701	486, 642
Lasts	60	510	137, 657
Lumber	26, 945	163, 637	132, 071, 778
planed	1, 113	13, 640	28, 728, 348
sawed	25, 817	149, 871	103, 102, 393
Oars	25	191	45, 845
Sash, doors, and blinds	1, 605	20, 379	17, 581, 814
Wood brackets, moldings, and scrolls	65	747	636, 423
Woodenware	269	3, 169	1, 623, 694
Wood, turned and carved	733	4, 113	1, 648, 008
miscellaneous	1, 001	2, 318	3, 504, 052
Total	63, 928	393, 383	309, 921, 403

Manufactures.	Number of establishments.	Persons employed.	Value of materials.
Bellows	13	117	$106, 735
Billiard-tables	39	505	650, 864
Boats	174	2, 381	1, 214, 016
Bridge-building	64	2, 069	3, 239, 771
Brooms and brushes	635	5, 206	3, 672, 837
Building	24, 908	112, 820	95, 694, 685
Building materials	33, 207	251, 582	173, 198, 451
Carpentering and building	17, 142	67, 864	65, 943, 115
Carriages and sleds, children's	53	913	495, 281
Carriages and wagons	11, 847	54, 928	22, 787, 341
Cars, railroad, and repairs	170	15, 931	18, 117, 707
Charcoal and coke	167	3, 473	1, 204, 779
Coffins	642	2, 365	1, 412, 078
Furniture, &c	{ 6, 312	57, 091	28, 516, 544
	{ 5, 423	40, 554	21, 669, 837
chairs	529	12, 462	3, 979, 743
refrigerators	27	267	192, 409
Machinery	1, 737	30, 781	22, 575, 692
Matches	75	2, 556	1 179, 666
Millwrighting	189	507	384, 787
Patterns and models	165	867	235, 933
Pumps	465	1, 905	970, 547
Ship and boat building	971	14, 051	9, 727, 820
Ship materials, &c	762	11, 063	8, 252, 394
Show-cases	47	353	419, 466
Toys and games	49	615	159, 946
Washing-machines, &c	64	462	454, 562
Wheelbarrows	23	238	166, 4[illegible]0
Wheelwrights	3, 613	6, 989	1, 907, 418
Total	109, 512	700, 915	488, 530, 844

BREWER'S ANALYSIS OF OUR FOREST-RESOURCES.

In the Statistical Atlas of General Walker occurs the following careful analysis of our forest-wealth, prepared by Professor BREWER, of Yale College, which will be found valuable in connection with the foregoing statistics:

Considered botanically, the flora of the United States is very rich in woody plants. The actual number of species is not known, but 800 is perhaps not too high an estimate.

There is no dividing-line in nature between trees and shrubs; the arbitrary rule adopted by most botanists is to call *trees* only such species as grow to 30 or more feet high; less than that are *shrubs*. Sometimes, however, the habit of the plant will place among the trees a plant which, from size alone, would be called a shrub.

An examination of various authorities shows that upwards of 300 indigenous species of trees are known to botanists growing within the limits of the United States, which attain the height of 30 feet. About 250 of these are somewhere in the United States tolerably abundant, or, at least, not rare.

If for our purpose we exclude all the smaller trees that never attain a height of 50 feet, also those tropical species, however large, which occur with us only in extreme Southern Florida, also a few Mexican trees found only along our extreme southern border, also such rare species as may occur only in Alaska, also all those very rare species nowhere common, and consider only the larger trees which are somewhere in our territory tolerably abundant, we have still about 120 species, of which about twenty species attain a height of 100 feet, twelve a height of 200 feet, while perhaps five or six may attain a height of 300 feet and over. Of the 120 species indicated, about fifty belong to the *Coniferæ*. How many of these species are of special importance in commerce, or in the home industries, (of other use than for fuel,) it is impossible to say, but it is a very large proportion of the whole number. Many of the smaller species, however, and of the larger shrubs, give special character to large areas of woodlands, and cannot be ignored in any discussion of American trees, whether considered botanically or economically.

A glance at the map shows large regions either treeless or very sparsely wooded. It is possible to cross the continent, from the Pacific to the Gulf of Mexico, without passing through a forest five miles in extent, or large enough to be indicated on the map. Then, again, the woodlands of the East are separated from those of the West by a broad, treeless plain from six to fifteen degrees wide. The forests and woodlands on the two sides of this gap are entirely unlike in their aspect and in their botanic characters. On the eastern side, broad-leaved, hard-wood species predominate, both in abundance of individuals and in number of species, the forests of large areas consisting entirely of such kinds. On the west, the forests are entirely of *Coniferæ;* other species occur, some of great value, but they nowhere (or at most in only rare cases in the extreme west) form a conspicuous or even noticeable element in the forests. Not a single species forms a noticeable element in the forests of both sides; the nearest approach to it is the aspen, (*Populus tremuloides*,) which is a common tree in the North from the Atlantic to the Pacific. Two species of cottonwood are also abundant in some localities, and form an important element in the fringe of wood bordering streams, but are never otherwise a conspicuous element in the forests of the West. These three species of poplar are the only broad-leaved trees that figure as trees both sides of the central treeless plains; but others stray across as mere shrubs on one side. Among the *Coniferæ*, one cedar is found on both sides as an abundant wood in places, but it is a low, crabbed growth west, a large shrub oftener than a tree. Neither beech, nor elm, nor hickory, nor mulberry, nor basswood, nor tulip-tree, nor magnolia, nor sassafras forms an element in the forests of the Rocky Mountains and westward.

For convenience in discussing the kinds of wood, we may divide our domain into ten geographical divisions, viz: 1st. New England; 2d. The Middle States; 3d. The southeastern region; 4th. The northwestern region; 5th. The southwestern; 6th. The plains; 7th. The Rocky Mountain region; 8th. Arizona, New Mexico, and the Great Basin; 9th. The Pacific region; and 10th. Alaska.

Only *native species* are considered in the following discussion of the kinds of wood. So much confusion exists in the popular and commercial names of many of our trees that the botanical name is given where necessary for precision, One example is sufficient to illustrate this confusion of names. The most widely spread and valuable of western timbers, *Abies Douglasii*, which grows from British Columbia to New Mexico, is known in its different localities under the various names of Douglas fir, red fir, black fir, Douglas spruce, red spruce, black spruce, hemlock, Oregon pine, western pitch, Bear River pine, swamp pine, and perhaps others; moreover, nearly all of these names

are also applied to other species. Similar confusion exists in the popular names of not a few species.

New England was originally entirely wooded, and has about eighty or eighty-five species of trees, of which about sixty may reach 50 feet in height. Maine is a great source of pine-spruce lumber, but, as a whole, hard-wood species predominate, particularly south of the forty-fourth parallel. Many of these hard woods are noted for their durability and texture, and form the raw material for a great variety of manufactures, particularly of carriages and various tools and implements where tough wood is an essential part. The extent and variety of manufactures in wood is relatively greater in this region than elsewhere, and ship-building is an important industry. The large timber used in house and ship building is unquestionably rapidly diminishing, but the area of woodlands is not decreasing in the same ratio. In many places the large trees suitable for sawing are cut without clearing the land of the smaller growth, leaving it still *woodland;* and as such it is shown on the map. As a whole, the *area* of woodlands in this region is but slowly, if indeed at all, diminishing, and in large districts it increases from year to year. This is particularly the case in portions of the western part, where hilly regions, formerly largely in tillage and pasturage, are now growing up with trees, mostly of hard-wood kinds. Some of the timber thus grown is considered peculiarly valuable in manufactures, where strength and durability are needed. This extension of woodland areas is by natural process. Few, if any, forests have been planted, except on the sandy regions along the southern part and on the islands, where pines have been planted to some extent. The extensive planting of trees for shade and ornament, however, increases largely the actual amount of wood in this region. To appreciate how much it is only necessary to see many of the New England villages and cities from some height in the summer, where the abundance of trees gives the appearance of a forest to the scene. Some of the cities have more actual wood growing in their streets and parks than is sufficient to be termed a heavy "forest" or "timber" in the sparsely-wooded regions of the West. In New England, the elm, and perhaps the sugar-maple, attain their finest development and greatest abundance.

The Middle States have about 100 to 105 species of trees, 65 to 67 of which sometimes reach 50 feet in height. The region was originally entirely wooded. Over much of it the forests were very heavy, and there are still immense quantities of timber available. The forests of this region are usually made up of quite a number of species; in some places the broad-leaved species predominating, in others the *Coniferæ;* but both kinds commonly grow together, the *Coniferæ* usually less abundant in the southern and western portions. The deciduous oaks, chestnut, beech, two species of ash, and perhaps the white pine, attain in this district their greatest size. The original and some of the remaining forests are noted for their grandeur. On the ridges of the Appalachians, which cross Pennsylvania and New York, while the hard woods may not attain their greatest size, some of them, particularly white oak, white ash, and some of the hickories, are believed to attain their greatest perfection as regards strength and durability, or at least they are only equaled by the timber of the same species extended on the line of these ridges beyond this district in both directions. This is a matter of great importance in ship and boat building, and in the manufacture of railroad-cars and of agricultural implements, all of which industries are here prominent. In portions of New York and Pennsylvania there are still large forests of excellent timber almost untouched by the axe; but, as a whole, the woodlands and forests are rapidly diminishing, both in area and in aggregate value, and there is as yet no corresponding compensation. Probably the price of timber must advance considerably before adequate means will be taken to produce a future supply by growth. How much this may be aided by wise legislation is still a problem.

The southeastern region, extending from Virginia to Florida, is the richest in species, is of peculiar interest to the botanist, and of first-class importance in commerce. (We cannot say that any one wooded region is *more* important than others, inasmuch as *wood* is a prime necessity in any civilized community.) This region, originally entirely wooded, has upward of 130 species of trees, (a much larger number, indeed, if we include the larger shrubs and the tropical species of extreme Southern Florida,) 75 of which attain a height of 50 or more feet, and perhaps a dozen species attain a height of 100 feet. A belt of pine timber extends nearly the whole length of this district, of varying width, occupying a part of the region between the mountains and the sea. This is the great source of hard-pine timber, (known in commerce as hard pine, yellow pine, heavy pine, pitch-pine, southern pine, and Georgia pine.) State statistics show that the annual export from Georgia alone now amounts to from 200,000,000 to 300,000,000 of feet per annum. The trade is yearly growing, and the adjacent States are contributing largely to the supply. But this is not the only commercial lumber of this district. The live-oak of Florida has a reputation throughout the world as ship-timber. The hard woods of the mountain-ridges have been less utilized than the growth of the regions already spoken of; but this is not owing to any inferiority of the wood itself. It is believed that the white oak attains its greatest development of

strength in certain parts of Virginia and West Virginia, hardly equaling in size, however, its greatest development in the States immediately north. While pine is abundant along the belt mentioned, and is at present of greater commercial importance; the broad-leaved species are the most abundant element in the forests. Here we find the magnolias and many flowering trees and shrubs in their greatest development and beauty. The area of woodlands, as a whole, has not probably much diminished of late years; but the trees suitable for hewing and sawing are decreasing under the heavy draughts made by commerce. In very many cases the land is despoiled of only its best timber-trees; the others are left, so that it is yet a "woodland," and in due time a new crop of timber will result. The data for the preparation of the map of this region are more imperfect than for either of the regions before enumerated.

The northwestern region extends from Ohio to Iowa and Minnesota, inclusive. In its original state it had every variety of forest feature represented, from the heavy forests of broad-leaved species of the Ohio bottoms and the dense *Coniferæ* forests of Michigan, through every gradation of lighter forests, "openings," and "belts," along the streams, to the grassy prairie and the treeless plains which everywhere terminate this district on the west. It is represented by about 105 to 110 species, about 68 or 70 of which may reach a height of 50 feet. In Southern Ohio and Indiana, the forests are of broad-leaved species; oaks and various hard woods grow to magnificent size and of good texture, while black walnut, bass-wood, white wood (or tulip-tree) attain here their greatest development. The pine region may be said to begin in Northwestern Ohio and extend across Michigan and Wisconsin to Northern Minnesota. The northern parts of the three States last mentioned now furnish a larger quantity of sawed lumber than any other part of the country. The census of 1870 gave the total production of sawed lumber in the United States at 12¾ millions M feet, and of this Michigan furnished over 2¼ millions, and Wisconsin over one million, the two States producing upward of one-fourth of the whole yield of the country. The Chicago Lumberman's Exchange gives as the receipts of "lumber" at that city over a million M feet for each of the three years since that census. This is sawed lumber, exclusive of laths, shingles, and all forms of hewed timber. A prominent journal, devoted to the lumber-trade, gives the production of *logs* for a single river during the last winter (1873-'74) as 433 million feet, and deplores the dull trade, as shown by such a short crop. To illustrate the capacity for sawing lumber, it may be stated that a single mill in Michigan, recently, (on June 3, 1874,) as a test of capacity, sawed 179,718 feet of lumber in three working hours, the actual running-time being two hours and forty minutes. (This is given on the authority of a local journal.) Many mills boast a capacity of 50,000 to 150,000 feet per day. But these examples of production tell a story of destruction also; and great as is the supply of pine in this region, it is so rapidly diminishing under the demands of the growing cities of the West, that serious apprehensions are awakened of a scarcity within a comparatively few years.

The data for Northeastern Minnesota are very meager, and that portion of the map has been prepared according to such scanty information as could be collected. For Southern Minnesota, I am indebted to the State surveyor-general for a detailed map of the areas of woodland and prairie.

Between the pine forests and the treeless plains, the prevailing trees are of broad-leaved species, sometimes forming forests of considerable density and size. Sometimes the limits of prairie and woodlands are well defined; at others there is a regular gradation, through "glades" and "openings," from the actual forest to the prairie. It must be remembered that the uncolored portions of the map are by no means always treeless. A region with less than forty acres woodland per square mile, if sparsely settled, may have sufficient timber and wood for the ordinary wants of such a population.

Again, there are other regions without actual trees, but with low shrubs, sufficient for fuel and many other uses. The prairies of this region are the typical prairies of the country. Respecting their origin and the conditions which have rendered them treeless, there have been many theories, which it is not necessary here to discuss. Periods of excessive drought, fires, the physical texture of the soil, are the leading theories, some advocating one, and some another. Where the prairies are uncultivated or have at most but a sparse population, the patches of wood (where they occur) are doubtless diminishing in number and area through man's agency.

Where, however, a prairie region is largely occupied by settlers and a considerable part is under cultivation, the amount of wood is doubtless rapidly increasing. This is brought about in part by checking the fires which would otherwise kill the trees while young, in part by fostering in various ways any spontaneous growth of wood that may occur, and in part by actual planting. In some places the aspect of the country has been entirely changed in this character by the settlement of the country; and in the more fertile regions there seems no good reason why a future supply of wood and timber may not be produced on lands originally treeless, whenever the price is sufficiently enhanced to make a successful growth profitable.

The southwestern region extends from Kentucky and Missouri to Alabama and the

western edge of the timber in Texas. Originally the eastern and southeastern portions were heavily wooded, prairies, however, occurring far eastward in the district, increasing in number and area westward, until the dry and treeless plains are reached which skirt the whole western border. It has about 112 to 118 species, 60 to 65 of which attain a height of 50 feet. The belt of pine of the Southeastern States extends into this region near the Gulf in Alabama, thence running west and leaving the coast, extending into Indian Territory and Texas. This belt is not continuous, however, west of Mobile Bay, and there are other detached areas of considerable extent with valuable "pine-lands." In this district are swamps having an immense growth of cypress. Although so much of *Coniferæ* may be found, broad-leaved species constitute by far the most abundant element of the forests, embracing both hard and soft woods, and some species, which are shrubs or small trees elsewhere, attain in this district large dimensions. Sassafras, which is but an insignificant tree in New England, in Missouri becomes a tree sometimes three or more feet in diameter, equaling camphor-wood for the manufacture of chests for household use. Black walnut also is abundant in places and grows to a great size, and various species of timber-trees are abundant over large parts of this district. This region has not furnished so much wood or timber to commerce as either of the districts before considered. This is not due to any deficiency in quantity or quality of its woods, but entirely to other causes. In this district as in the northwestern, the woods diminish westward, and finally fade out in the "oak openings" and "cross-timbers" of Texas and the fringes of wood that follow the streams far beyond the other trees into the plains west.

Over most of this district, particularly the better wooded portions, the area of woodlands is not seriously diminishing, but, as elsewhere in places most available for commerce, the better timber-trees are disappearing. In the western borders, where the supply is at best sparse, it grows yearly less by the destruction or use of the scanty supply, and no efforts are made to replace it.

West of the districts described, the treeless belt already spoken of, separates entirely the wooded portions of the two sides of the continent, a belt extending from Mexico to the Arctic Ocean. It is fully three hundred and fifty miles wide in its narrowest part, between latitude 36° and 37°, widening to our northern boundary where it is eight hundred miles wide, or wider if we include a few outlying patches of timber on some of the northern ridges and mountains. Different parts of this belt, "the plains" in common language, vary greatly in their aspect. Sometimes they are absolutely treeless as far as the vision extends; in others a fringe of timber from a few rods to several miles wide skirts the streams, while the spaces between are treeless; and again in others, particularly northward, some of the intervening hills are dotted with scattered cedars, usually shrubby and crabbed, but in places attaining the size and dignity of trees. The Black Hills have heavy forests of pine and spruce, and appear like a forest-island three hundred miles long rising out of this sea of plain far from the forests of either side. A few other similar though smaller detached forests occur in this treeless waste. The causes which have left this great area so bare are, without doubt, mostly climatic. Although in places the character of the soil is unfavorable, the great cause is doubtless the scanty or capricious rainfall of the region. What can be done toward clothing this with trees by artificial means is an entirely unsolved problem.

The Rocky Mountain region lies near the chain so called and north of latitude 36°. From the Columbia River northward to Alaska, forests clothe the whole mountain belt, except where too high, or on limited parks and prairies. On our northern boundary, the treeless plains suddenly cease at the eastern base of the chain, (about longitude 113° 40′ west,) and heavy forests are almost continuous thence westward to the Pacific South of the Columbia River (about latitude 38° north) the forests of this chain are everywhere separated from those near the Pacific by dry and treeless plains and valleys of greater or less width. The forests of the northern part of the chain are continuous from Alaska southward to about latitude 42° 40′ north, where a nearly treeless belt about a hundred miles wide cuts entirely through them from the bare plains east to the more barren basin in the interior. South of this belt, forests begin again and extend southward from Southern Wyoming across Colorado and into Northern New Mexico, more than four hundred miles, with a width of two hundred to two hundred and fifty miles. This forest is of varying degrees of density and interspersed in it are many treeless, or nearly treeless valleys called *parks*. This forest is surrounded on every side by treeless areas, the limits usually sharply defined except along the southern and southwestern edge, where they shade off more gradually in density. The northwestern part of this forest is continuous with the forests of the north slope of the Uintahs, and these again with the forests of the Wasatch of Utah. Southwesterly in New Mexico and Arizona, are detached forests of similar character, clothing in each case mountain chains. These forests are everywhere of *Coniferæ*. The whole tree vegetation consists of twenty-eight or thirty species, about one-third of which are broad-leaved kinds and two-thirds conifers, the latter constituting the forests. Of the former, box-elder (*Negundo aceroides*) occurs most abundantly along the eastern base of the mountains; two kinds of cottonwood, along the streams and mostly out on the

plains or in the parks; alders along the streams but higher in the mountains; the aspen as a small tree (locally known as *Asp*) in the mountains and on the margins of the parks. No oaks occur as trees, but a scrubby form, (*Quercus alba*, var. *Gunnisonii*,) rarely more than 10 to 20 feet high, sometimes occurs on the foot-hills of the south. These and a few other species known to the botanist but not abundant as wood, and usually here as stragglers from some other region, make up the ten or eleven broad-leaved species. The great Colorado forest spoken of consists essentially of five species of conifers, viz. *Pinus ponderosa*, (called here yellow pine,) *P. contorta*, (called tamarac, and red pine,) *Abies Engelmanni*, (really a spruce, but called "white pine," as it has a soft, white wood,) *A. Mengiesii*, (called here balsam,) and *A. Douglasii*, (called by a variety of names.) These five species are by far the most abundant, large areas often being covered almost exclusively by but one or two of them. Other species, not here named, are frequently met with; "not rare," as the botanist would say, but of vastly less economic interest than the species enumerated. On the outlying spurs and ridges which extend into the woodless region on every side, scrubby cedars are found, and in the drier valleys the nut-pine or piñon (*P. edulis*) is abundant, particularly southward—a low, scrubby tree, usually less than 20 and rarely more than 35 feet high. These, with a few others, make up the eighteen or twenty species of *Coniferæ*. The data for this part of the map are quite full and believed to be reasonably accurate. The timber of this region is diminishing vastly faster than a legitimate use demands. Where one tree is cut for use, ten perhaps are killed by fires, which destroy great forests nearly every year, kindled by the carelessness of the whites, or perhaps as often by the Indians, who sometimes fire the forests to drive out game, sometimes to annoy an enemy, and sometimes no one knows why. Whatever may be the cause, blackened trunks disfigure many hundreds of square miles.

For that portion of the Rocky Mountain region lying between the forty-third and forty-ninth parallels the data for the maps are, as a whole, rather meager. For Idaho and the Yellowstone region, they are more complete and reliable, but for the region north and east of the Wind River Mountains they are scant and unsatisfactory. The map is colored according to the best information available. I have reason to suspect that the average of timber indicated is too high. The species of the northern Rocky Mountain region are perhaps the same as those south, but varying in relative abundance. The two magnificent firs, *Abies grandis*, (called "white spruce," but in Oregon "yellow fir,") and *A. amabalis*, become more abundant. In the northern part, particularly in the Kooskooskie region, heavy "pine-forests" are reported.

West of the Rocky Mountains is another treeless or sparsely wooded region, which extends from the Columbia River to Mexico. Its northern portion narrows northward, but forms an important part of the valley of the Columbia and its tributaries; it embraces the whole of the great basin except insignificant edges of the rim; it throws out an eastern branch entirely through the Rocky Mountains, and southward it is continuous with the treeless or sparsely wooded region which extends across the continent along our southern frontier. In this area occur the driest and the most inhospitable deserts of our country. It is of too varied character to admit here of details. Some portions are grassy prairies, some are plains of lava, others are deserts of drifting sand, others are half-naked rock cut by cañons, others are "alkali plains" and "salt valleys," others are great areas covered with "sage-brush" and "grease-wood," others pass into chapparal—in fact, there is every gradation, from naked barrenness to great forests. Some of the mountain-chains found in this area are as bare of trees as are the valleys themselves; others have large shrubs of scrubby pines or cedars, while others are clothed with forests. The extreme northern part consists largely of lava plains. South of this, the Blue Mountains of Eastern Oregon have heavy forests of pine, fir, and spruce of the same species found in the northern Rocky Mountains. Still south of this are the "sage-plains" and "deserts." In Nevada the valleys are treeless, (with very rare exceptions,) the ridges sometimes bare, sometimes dotted with shrubs and scrubby pines, the actual amount of wood being small, yet of inestimable value to a country so rich in minerals and so poor in wood. Over parts there is crabbed, shrubby growth, becoming, in places, chapparal, but oftener of scattered shrubs, attaining in favorable places the size of small trees. One of these, called "mountain mahogany," (*Cercocarpus ledifolius*,) is often over 30 feet high, with a base 2 feet in diameter, the wood very hard, close-grained, dark-colored, and taking a beautiful finish when wrought. The shrubby vegetation of the region, including as it does the "sage" bushes, "grease-woods," "creosote bush," &c., is of great interest to the botanist, but can hardly claim further notice here.

South of latitude 35° are a few species of small trees of much greater value. Of these, first in importance is the mesquite, (*Prosopis glandulosis*,) which thrives in hot, dry places in the valleys and on the mesas, but is rare on the steeper slopes. The tree has a spreading habit, rarely more than 30 feet high and 12 inches in diameter. The very hard and durable wood is used for a great variety of purposes. Posts in use for fifty years are still sound, and its value for railroad-ties must ultimately be great. The fruit, consisting of eight to twelve "beans," in a long, sweet, pulpy pod, like that

of the carob (or St. John's bread) of the Old World, is a valuable food for animals, and even for man, while in Western Texas a considerable trade has sprung up in mesquite-gum, which is similar to gum-arabic. This species extends from California to Texas, and in the future will doubtless be extensively planted and cultivated. The tornillo or screw-pod mesquite (*Prosopis pubescens*) is smaller and of more restricted range, but of similar use. Another small tree, called arbol de hierro, or iron-wood, (*Olneya tesota*) is of much local value, and may become a commercial wood. Other broad-leaved trees occur; cottonwoods and sycamores are common along the streams. In parts of this region are several *Cacti* and one *Yucca*, attaining a tree-size, more picturesque in the landscape than useful to man.

The higher mountains of Arizona are well timbered with conifers. The prevailing species are red spruce (*Abies Douglasii*) and yellow pine, (*P. brachyptera.*) The most notable of these forests (the limits of which have lately been demonstrated by the explorations of Lieutenant Wheeler) extends nearly four hundred miles. Other isolated forests, occupying mountains, are indicated on the map. On many of the lower ridges, the piñon (*Pinus edulis*) abounds, furnishing food to the Indians and fuel to the whites. It is a crabbed shrub, rather than a tree, usually less than 20 or 25 feet high. Other trees occur of more limited range or abundance, the actual number known to botanists in the whole of this vast region amounting to about thirty-five species.

The Sierra Nevada and Cascade Mountains lie nearly parallel with the coast of the Pacific, with their eastern base one hundred to two hundred miles distant from it. This chain is nearly continuous from the northern frontier southward to latitude 35°, a distance of about one thousand miles, everywhere a broad and high chain, its summits far above the line of tree-vegetation, often in the perpetual snow, culminating in the loftiest peaks in the United States. Its broad western slope is everywhere heavily timbered. Along the coast for the same distance are the Coast Ranges, a system of mountain-chains more or less connected together, but broken by gaps and separated by valleys, and usually rather steep on the ocean side. They form a belt twenty-five to fifty miles wide, and are mostly between 2,000 and 4,000 feet high, but with numerous points rising to twice that height. The Coast Ranges are generally wooded. Between these two mountain systems a series of valleys extend their whole length, from Puget Sound to Southern California, cut across by a few ridges, so that it is not a single continuous depression, but rather a row of valleys.

North of the Columbia this valley is heavily wooded. The forests are open, but the trees are large, and little prairies are interspersed. Passing southward, the valley of the Willamette is largely prairie, but there is an abundance of wood for all uses. Between the Upper Willamette and the Upper Sacramento, several ridges cross from the Coast Ranges to the Cascades, and forests and prairies alternate. The former are heavily timbered. The great central valley of California is by far the largest of the series, and is treeless, or but sparsely wooded, for an area four hundred and twenty miles long by thirty to sixty miles wide. The northern half of this has more wood than the southern, where large areas are absolutely treeless, except a very narrow fringe along the few streams.

This region of mountain and valley, as a whole, and in all its relations, economic, scenic, and botanic, has, perhaps, the most interesting tree-vegetation known. The whole number of species known to botanists amounts to eighty-eight or ninety, but a vastly smaller number are found in any one botanical or commercial district. Many of the more noted species are very restricted in their range, and not more than three or four important timber-trees extend the whole length of the region. It is therefore necessary to treat its parts more in detail than in the case of the other districts. In this district are, perhaps, the grandest forests on the globe. In Washington Territory, they are made up of but few species, of which *Abies Douglasii*, (called here red fir,) is the most important. Commonly 150 or more feet high, and 4 or more feet in diameter, but sometimes 15 feet (in extreme cases even over 20 feet) in diameter and over 300 feet high, straight growth, the wood firm, elastic, holding spikes with great tenacity, it produces the most noted timber of the Territory. Oregon cedar, (*Thuja gigantea*,) yellow or "punkin" pine, (*P. ponderosa*,) yellow fir, (*Abies grandis*,) black spruce, (*A. Menziesii*,) are the next most abundant species, all attaining a great size. The popular names are much confused, the generic terms of cedar, pine, spruce, and fir are all very loosely and capriciously applied. The finest of the forests are about Puget Sound, and on the western flanks of the Cascades. On the Coast Ranges, the forests are denser, and with tangled undergrowth, but the trees not of such large average size. Regarding the wonderful quantity of wood produced, one authority (for many years surveyor-general of the Territory) states that the whole region west of the summit of the Cascades to the Pacific, and north of the Columbia, will yield "an average of 32,000 feet per acre of merchantable lumber." He states that about one-thirty-second part of this area is prairie. The following extracts from the annual reports of the Commissioner of the General Land-Office of the United States relate to this Territory: "The land will produce from 25,000 to 300,000 feet per acre," and "there are vast tracts that would cover the entire surface with cord-wood 10 feet in height;" "there are localities that

would afford double that quantity." Again, the reports speak of the forests of pine, fir, and cedar "which grows thickly, from 1 to 15 feet in diameter and 200 to 300 feet high;" and again, of the forests of "red and yellow pine of gigantic growth, often attaining a height of 300 feet and from 9 to 12 feet in diameter." Similar testimony could be greatly extended. In the extreme northeastern part, and east of the Cascades, are forests of pine; these forests are in character more like those of the Rocky Mountains, with which they are continuous.

Passing south of the Columbia River, the same species occur; but the forests are not so heavy, although individual trees may be as large.

Prairies become more numerous and larger, and oaks and other broad-leaved trees become more common in the valleys. In places, larch (*Larix occidentalis*) is abundant, and the yew (*Taxus brevifolia*) attains in Oregon and Northern California a height of 50 or 75 feet, a greater size than is attained by any yew elsewhere in America. As a whole, Oregon is very heavily timbered.

Passing southward to California, the tree-vegetation changes still more, and becomes the richest in species of any region west of the great plains, embracing a total of over eighty species.

Some fifty species of *Coniferæ* have been enumerated by botanists, embracing several species, and even genera, found elsewhere.

All the conifers of Washington and Oregon are found here, but not in the same relative abundance or size. The yellow pine (*P. ponderosa*) attains its greatest development, and is often over 200 or 250 feet in height, and 4 to 8 (sometimes 12) feet in diameter. The sugar-pine (*P. Lambertiana*) is perhaps the most valuable pine of the State; is abundant, of excellent quality, and great size. There are four firs (*Abies* of the section *Picea*,) three large spruces, and about twelve species of pine, more or less abundant. (More than twice that number of supposed species have been described by botanists.) The "big-trees" (*Sequoia gigantea*) occur on the western slope of the Sierra Nevada, and are too well known to need notice here beyond the remark that the ease with which they are propagated, and their valuable timber and rapid growth, will doubtless give them great value for cultivation in the future. Of more present value is the red-wood, (*Sequoia sempervirens*,) which only grows very near the sea, between latitude 36° and 43°, and on portions of this coast forms forests rivaling, if indeed not exceeding, any found elsewhere on the earth. The trees are often 10, and sometimes more than 20 feet in diameter, very straight, 200 to 300 feet high; and the wood, which is light, is straight-grained, very durable, and adapted to many uses. It is extensively cut, and the lumber shipped to South America, the Pacific islands, China, and even to New Zealand. It is rapidly diminishing in quantity, and the only slight compensation is that when cut a new growth sprouts from the stump, which is not true of any other timber-tree belonging to the *Coniferæ*. California cedar (*Librocedrus decurrens*) occurs in the mountains of large size. Several species of cypress, (*Cupressus*,) the California nutmeg, (*Torreya*,) and cedars of smaller size abound. Among the broad-leaved trees there are many of great beauty, but there is a great lack of hard woods. The laurel (*Tetranthera californica*) has been sparingly used in ship-building; an ash, one maple, (neither abundant,) and some of the oaks do service where smaller hard woods are needed, but the supply is deficient. But among these trees are some of marvelous beauty, particularly among the oaks. Two cottonwoods, two sycamores, the Madroña, (*Arbutus Menziesii*,) and other trees are not rare.

The data for Alaska are insufficient to construct a map of distribution and density of timber with reasonable accuracy; so the attempt is not made. Some portions of that extensive territory are heavily wooded, other portions are treeless, and there is every gradation, but the relative areas of each, and their boundaries, are unknown. Official reports speak of the forests as "being really magnificent, covering the lower hills and uplands with dense masses of pine, spruce, fir, hemlock, cedar, and other valuable timber, principally evergreens." Again, that "the forests extend almost to the water's edge along the southern shores, but north and east of the Alaskan peninsula they exist only in the interior, except at the heads of bays and sounds," while the inland forests are abundant, extending to within a short distance of the Arctic Ocean. In establishing the United State smilitary post of Fort Tongas, "in clearing the timber for this post, a magnificent growth of yellow-cedar trees, 8 feet in diameter and 150 feet in height" was found. "Nearly the whole of the Yukon district is well supplied with timber;" and much more appears to the same effect.. Of the species on the Yukon, Mr. Dall states that the white spruce (*Abies alba*) is the "largest and most valuable tree" found in the Yukon district. The next in importance is the birch (*Belula glandulosa*). Various other species are mentioned.

TESTS OF DEPARTMENT SEEDS.

THE CEREALS.

In the distribution of cereals, the Department furnishes, from the results given, incontestable proofs of their superior worth and prolific yield. Not only are these in Maine and Texas, but from the great Northwest to the Floridas, from the Atlantic to the Pacific, one universal voice attests their popularity. While a few of the more valuable of foreign grains have been imported here and sown to test their worth, the great number of those which produced most largely and the best were the grains indigenous to this country. This, in itself, is a matter of great congratulation. It is an incentive to our hardy farmers to exercise greater care and skill in the improvement of grain and in the production of more abundant harvests.

The Department has been very fortunate in the distribution of the wheats, purchased for the purpose; one variety has accomplished a good work, then given place to another, which has done better, and the year of 1875 evidences a grand superiority over all others in the wheats distributed. The "Fultz," the "Clawson," the "Tappahannock," and the "Jennings," have all done their parts in enhancing the yield of the crops and, with inconsiderable exceptions, their superior worth has been attested everywhere.

In illustration of results of distribution we give a few brief extracts from the letters of correspondents in various States and Territories of the Union:

WHEAT.

ARKANSAS.—*Hempstead:* The packages of Tappahannock wheat were placed in good hands, and have done finely. It yielded more largely and better grain than any other wheat cultivated. *Washington:* The Fultz wheat has done better this year than last. It yielded about 18 bushels per acre—8 more than the average; weight, 64 pounds per bushel. The four quarts of Clawson yielded 2½ bushels of good wheat. It matures about seven days later than the Fultz. *Craighead:* The two quarts of Clawson yielded 2¾ bushels—twice as much as other varieties; a large white grain, clear of disease. *Yell:* The Clawson is ten or twelve days later than the common wheat; damaged somewhat by the rust, but measured 4¾ bushels from one-fifth of an acre. It made from 80 to 125 stalks from 1 grain; heads average 6 inches in length. *Pope:* The Tappahannock yields twenty-fold. *Prairie:* In the county adjoining, 423 bushels of wheat were produced on 7 acres—60¾ bushels per acre.

CALIFORNIA.—*San Joaquin:* The Clawson wheat, mowed with scythe and trodden out with horses, yielded over 50 bushels per acre, notwithstanding a great quantity was wasted. Think it the finest wheat I ever saw.

COLORADO.—*Weld:* Have carefully cultivated the two quarts of white Australian wheat, received from the Department in 1872. Raised this year 260 bushels on 13 acres, notwithstanding grasshoppers were very numerous. *Bowlder:* The Touzelle made a very rank, strong growth; think it an excellent wheat.

GEORGIA.—*Floyd:* The Tappahannock wheat, one quart, weighing 1¼ pounds, was sown and yielded 220 pounds. The grain is white and large; larger than ordinary.

ILLINOIS.—*Jasper:* From the four quarts of Fultz wheat harvested 4⅛ bushels; quality excellent. Think it will prove very valuable in this locality.

INDIANA.—*Harrison:* Sowed one of the four quarts of Clawson wheat sent from the Department, giving the remainder to my assistants. Harvested 30 pounds, notwithstanding the lack of snow in winter and the excessive wet in summer. The yield would have been double under more favorable circumstances. One of my assistants produced, from his one quart, 54 pounds; another, 36 pounds. The Tappahannock wheat has become a great favorite. The Fultz has also proved valuable. *Orange:* The four quarts of Fultz wheat produced 1⅝ bushels. The four quarts of Clawson, 1¼

bushels. This is more than treble the average of the county, and double that of this neighborhood. *Elkhart:* Have grown 3 bushels of good wheat from the two quarts of Fultz. Think it a valuable variety. *Switzerland:* The four quarts of Clawson wheat were sown upon thin clay soil. The season throughout was the most unfavorable ever experienced for wheat-growing. The yield was 1¾ bushels; the wheat as fine in quality as was ever produced in the county. Had the season been fair, treble the quantity would have been the result. Further experiments with the Fultz confirm the former statement that it and the Clawson are the best varieties for this section.

IOWA.—*Clayton:* Of the Clawson wheat from the Department, one quart produced 18 pounds; one, 14½ pounds; and one, 46 pounds. *Monroe:* The Clawson very fine; not a grain of cheat in it; stood the winter well, and will be the wheat for Iowa.

KANSAS.—*Montgomery:* In 1872 I gave to a neighbor, Mr. Benjamin Murphey, a sample of Fultz wheat, received from the Department. From the first sowing he obtained 1 bushel. This he sowed broadcast on an acre of prairie bottom, second year from the sod, and harvested, in 1874, an even 50 bushels. In October, 1874, he sowed 25 acres with the same. The land was prairie-bottom loam, plowed 10 inches deep, harrowed, and the wheat drilled in, and rolled in the spring. The crop was harvested June 16, 1875, and thrashed 1,350 bushels—54 bushels per acre. The wheat of the third crop appears much improved over the sample.

KENTUCKY.—*Bourbon:* The Clawson and Jennings were both sown broadcast upon good clover land, with a clay subsoil, at the rate of 5 pecks per acre, being the usual quantity in this vicinity. Both came up well, grew most luxuriantly, and stood the winter and spring frosts better than any other variety; both suffered materially from rust, on account of the unusually wet season, but not more than any other variety. They stood remarkably well—the Clawson the best—showing no signs of lodging, and producing the largest yield and fullest grain. The Clawson yielded about one-third and the Jennings one-fourth more per acre than Tappahannock and other varieties. The experiment, notwithstanding the unfavorable season, is sufficient to demonstrate that both varieties are well adapted to our climate and soil. *Simpson:* From the four quarts of Fultz wheat, from the Department, gathered 5 bushels of as fine wheat as I ever saw.

MARYLAND.—*Charles:* From the ten quarts of Clawson wheat, I have 2¾ bushels. If it had been thrashed immediately after harvest there would have been over 3 bushels—a great improvement over other kinds. *Cecil:* The Clawson wheat is the finest ever grown here. *Calvert:* The Clawson came up well, and was not killed out by the very cold winter. The grain is plump, white, and heavy. Believe it to be a valuable variety. *Queen Anne:* Reaped from six quarts of the Clawson 10½ bushels of good, clean wheat, being at the rate of 56 bushels for one of seed. *Harford:* The Fultz wheat appears to be the favorite for sowing this season, the average yield being greater than of any other. The Clawson made a very heavy yield, but the grains were somewhat shriveled. *Wicomico:* The yield of the Clawson white winter wheat is 21 bushels for one. It is said to be the best produced here for years.

MICHIGAN.—*Saginaw:* Harvested from the 3½ pounds of spring wheat, sent by the Department, 1¼ bushels, weighing 65 pounds per bushel. *Tuscola:* The Fultz red wheat from the Department is splendid. From two quarts I have 2 bushels—one-half bushel more than from any other kind. It is very hardy, and eight to ten days earlier than any other variety here. *Todd:* The Arnautka wheat did well; the four quarts yielded 3 bushels.

MISSOURI.—*Pike:* From two quarts of Fultz wheat raised a little over 1 bushel; this produced 25 bushels. It proves to be an early, hardy wheat, standing the winter better than any other in the county—the best wheat for this soil and climate. *Pulaski:* Sowed the six quarts of Fultz wheat on fair upland, side by side with the Walker wheat. It did not freeze out any, while the latter froze out fully one-half. Yielded 2¾ bushels, about one-half being lost by untying the sheaves for drying, which was done three times before it could be put in the stack. Grain full and plump—larger and better than any other wheat cultivated here. *Bollinger:* The eight quarts of Fultz wheat, received last year, were sown on upland, late in the season, and, in spite of the chinch-bug, made a very good yield, the quantity thrashed and cleaned being 5½ bushels by measure, or 6 by weight.

NEW MEXICO.—*Socorro:* The eight quarts of Tappahannock wheat sent me some time ago did not have a good chance, on account of the dry year and scarcity of water for irrigation. The product was 140 pounds, which I planted this year on a piece of land 500 feet in length and 160 in breadth. The yield was 3,220 pounds. The grain in sound and heavy, and produces the very whitest kind of flour.

NORTH CAROLINA.—*Person:* The two quarts of Fultz wheat from the Department yielded 32 per cent., and weighed 66 pounds per bushel. It is the finest wheat I ever saw. *Alamance:* The six quarts of Fultz wheat sent me yielded 5 bushels of good grain. *Halifax:* From the two quarts of Clawson 1 bushel of most excellent wheat was thrashed, notwithstanding the cold winter and other drawbacks. *Surry:* The four quarts of Jennings white wheat were sown on upland, after corn crop, using no

fertilizer. The yield was at the rate of 24 bushels to 1, and the weight 62 pounds per bushel. It is a fine wheat. *Jackson:* The four quarts of Fultz thrashed out 2 bushels of nice, large-grained wheat. *Forsyth:* From the Clawson wheat sent me, raised 41 bushels from 1. This is the best ever done in this county. *Wilkes:* The 3½ pounds of Clawson yielded 120 pounds. *Orange:* The Fultz wheat was extensively distributed last season, and more so this. It has exceeded all other varieties in yield and quality. It seems better adapted than many other varieties to our climate. It was tested the past season with several new varieties brought from the North, and while they, having an equal chance, failed, it did well. It stood the unfavorable winter and late frosts with but little damage, while other varieties were much injured. The largest yield, without commercial fertilizers, reported is 35 bushels from 1. It is regarded as among the best, if not the very best variety in the county.

OHIO.—*Stark:* The seven quarts of Jennings wheat produced 3½ bushels. Stood the winter the best of any variety in this section. *Belmont:* The 15 pounds of Fultz wheat produced 4½ bushels, though half of it was winter-killed. It was awarded the premium for the best wheat at our county fair.

PENNSYLVANIA.—*Chester:* The eight quarts of Clawson produced 3 bushels of clean wheat. It had a vigorous growth, and ripened early, though a little later than the Fultz. If it does as well this season, all raised will be wanted for seed. *Clearfield:* From the Tappahannock, received from the Department two years ago, I was able to sow, last season, 1¼ bushels, which produced 33¼ bushels, weighing 64 pounds per bushel; from 1¼ bushels of other wheat harvested but 12 bushels. Think the Tappahannock the best wheat ever introduced into this county. *Greene:* The two quarts of Jennings wheat yielded 1½ bushels. It stood the winter and spring frosts better and is one week earlier than any other wheat in this section.

SOUTH CAROLINA.—*Abbeville:* The two quarts of Jennings yielded 2 bushels of good wheat. *Chester:* The four quarts of Tappahannock, sown on red-clay land, well manured, yielded 3¼ bushels of fine wheat, earlier by several days than any other.

TENNESSEE.—*Carter:* The Jennings white wheat, received last year, is the best to yield that I have ever seen. It will yield one-quarter more per acre than any other wheat in this country. *Henderson:* The Fultz wheat has fine, square heads; am well pleased with it, and will sow again. *Robertson:* Better pleased with the Fultz wheat than with any other variety in this section; the average yield is 30 per cent. greater. *Giles:* The Tappahannock wheat from the Department has proved the best variety yet cultivated in this section. From two quarts, and three times sowing, I have raised 702½ bushels, all of the best quality. *Rutherford:* From the one quart of Fultz wheat, sent last fall, I have thrashed 1½ bushels. It is hardy and prolific. *Davidson:* The Clawson wheat sent me grew finely. The winter was severe, but did not seem to affect it, though other wheat was frozen. The members of our grange, to whom a few heads were exhibited, thought it the finest wheat they had ever seen. *Cheatham:* From one quart of Clawson I made 1¾ bushels, weighing 106 pounds. The best wheat for Middle Tennessee. It spreads more than any other wheat I have ever seen. *Gibson:* From eight quarts of Fultz, I harvested 11 bushels of fine wheat. Shall sow all of the Fultz this fall.

TEXAS.—*Bell:* From the two quarts of Fultz sent me, made 60 quarts.

VIRGINIA.—*Roanoke:* The Clawson winter-wheat, notwithstanding the unfavorable spring, did very well; one quart, sown on average land, yielded 48 quarts of splendid grain; no extra care was taken. *Stafford:* The four quarts of Fultz wheat made about 3¼ bushels. *Halifax:* Received from the Department, in 1871, 15 pounds of Fultz wheat, and sowed it, the 26th of October, on gray-slate soil, following tobacco; harvested 661 pounds—about 11 bushels. In 1872, sowed 8 bushels on 8 acres of the same kind of soil, on clover fallow, and reaped 150½ bushels of clean wheat, weighing 63 pounds per bushel. In 1873, sowed 56 bushels on 55 acres, following tobacco and corn. The yield was 1,098½ bushels. Most of the crop was sold at $2 per bushel, for seed. In 1874, sowed about 30 bushels. The yield was good, but much was lost by sprouting, from the continued rains after harvest and before thrashing. The Fultz is early, hardy, smooth-headed, and remarkable for yielding, and for making nice, rich flour. The demand for this wheat, for seed, has been greater than I could supply, and its dissemination has been of great benefit to all who have been so fortunate as to obtain the seed. *Albemarle:* The Clawson wheat, from the Department, was a great success, producing at the rate of 32 bushels per acre. The two quarts of Fultz yielded 1$\frac{9}{16}$ bushels. *Page:* The Clawson ripened in good time; produced 1¼ bushels, weighing 65 pounds per bushel. *Nelson:* The two quarts of Clawson yielded 4½ bushels; heads 5 or 6 inches long. *Pittsylvania:* The two quarts of Clawson wheat yielded 82, and would have yielded 100, if it had not been seriously injured by the Hessian fly; quality, very fine. *Culpeper:* From the two quarts of Clawson, made 2 bushels; heads large and fine. *Campbell:* The Jennings wheat is the best ever seen in the State; produced, on 2 acres, 37½ bushels, although the losses from wet weather were considerable.

WEST VIRGINIA.—*Berkeley:* From the two quarts of Clawson wheat, the yield was 1¼ bushels. Notwithstanding the hard winter, it made a good stand. Some of the heads measured 6 inches in length. Think it a splendid variety.

WISCONSIN.—*Manitowoc:* Sowed the 23 pounds of Arnantka wheat from the Department, and, though it was badly eaten by "wire-worms" after coming up in the spring, I thrashed 4 bushels, weighing 63½ pounds per bushel. Think it not so liable to be attacked by grasshoppers as our common wheat, and the best wheat ever tried here. *Outagamie:* From 5 acres of Fultz wheat I thrashed 205 bushels, which weighed 63¼ pounds per bushel. It matured twelve days earlier than the "Michigan white." *Washington:* The Clawson wheat excels all others. It is of no use to try the French winter-wheats any longer, as the climate is too severe for them.

ASSOCIATION REPORTS.—The secretary of the agricultural society in Guilford County, North Carolina, forwards two reports of experiments with wheat from the Department, distributed by that society. The first states that two quarts of Clawson and two of Fultz, sown broadcast at the rate of about 1 bushel per acre, yielded, the former, 34, and the latter, 70 pounds. The Fultz also ripened eight days earlier than the Clawson. The second states that, sown by "Alling's garden-drill," on thin land manured with barn-yard compost at the rate of 20 loads per acre, with salt sown broadcast after the wheat was planted at the rate of 2 bushels per acre, two quarts of Clawson yielded 1 bushel and four quarts; of Fultz, 2 bushels. The Fultz ripened four days earlier than the Clawson. The secretary states that the reports of successful experiments with seed distributed by the Department are sources of great encouragement to the farmers in that vicinity.

The secretary of the farmers' club in Washington County, Virginia, reports that the Clawson and Jennings varieties received from the Department did well, considering the unfavorable season. Both stood the winter well, and the Clawson kept its color green, while the severity of the winter caused the other wheat in the same field to turn yellow. Of wheat fit for seed, six quarts of Clawson produced 2½ bushels and eight quarts; of Jennings, about 3 bushels. Some of both, damaged by the wet weather, was not measured.

The Indian Creek Farmers' Club, Monroe County, West Virginia, reports that the Fultz wheat received from the Department stood the winter much better than the common varieties, and yielded finely—in one case thirty-fold.

OATS.

ARKANSAS.—*Van Buren:* From the four quarts of Sandy oats from the Department, the yield was 5 bushels; grains fat and plump.

ILLINOIS.—*Jasper:* The four quarts of Somerset oats, sown April 10, yielded 3 bushels; grew too much to straw, and seem inclined to fall down.

INDIANA.—*Cass:* The Fallow-oats took the first premium at our county fair, weighing 47 pounds per bushel.

IOWA.—*Adair:* The Somerset and Early Fallow oats are the best ever introduced into this county. Yield from 50 to 80 bushels per acre.

KANSAS.—*Nemaha:* The White Schonen are the best of all oats, but the Somerset and the Early Fallow make a fine crop. *McPherson:* The Somerset oats have done well.

KENTUCKY.—*Hickman:* The White Schonen oats are pronounced by all the finest they have seen for years.

MAINE.—*Somerset:*—The Schonen, the Somerset, and the Canada oats have each proved a success.

MICHIGAN.—The Fallow oats sent me have proved a valuable variety.

MINNESOTA.—*Murray:* Planted the Schonen oats, received rather late; took no extra pains with them, but I never saw such a growth. They were the wonder of the whole section; people came quite a distance to see them. When about 4 feet in height the grasshoppers came, and I lost the crop.

MISSISSIPPI.—*Benton:* The Somerset oats were the best I ever saw in this climate The yield was over double that of the common oats.

MISSOURI.—*Pulaski:* The four quarts of Sandy oats yielded 4¼ bushels of heavy, clean, bright oats, weighing 49 pounds per bushel.

NEBRASKA.—*Webster:* The two quarts of Sandy oats yielded 2 bushels of good quality. The two quarts of Somerset yielded 2 bushels of extra quality, the finest oats I ever saw. *Adams:* The four quarts of Somerset oats yielded 7 bushels of clean oats

equal to the seed sown. *Furnas*: The Somerset and Sandy oats both proved good varieties.

NEW YORK.—*Chautauqua:* The Schonen oats have been tested by twelve members of our club, and they all pronounce them superior to any of our other oats. For the first two years they have taken the first prize at our county fair. In one case, they yielded 112 bushels by weight or 88 by measure, to the acre. *Wyoming:* The six quarts of Canada oats harvested over 3 bushels of very large, plump oats.

NORTH CAROLINA.—*Halifax:* The Somerset oats yielded well, and appear to be a fine variety.

OHIO.—*Darke:* From three quarts of Somerset oats thrashed 54 pounds. The yield was good and the grain plump and heavy. The variety promises to be a profitable one. *Mercer:* The Schonen are the best of all oats. *Logan:* The Potato-oats from the Department stood up perfectly, yielded probably one-fourth more than the Norway, and were decidedly superior to them. *Warren:* The Schonen oats from the Department were sown, and their growth and appearance flattering, until the army-worm came and destroyed them.

PENNSYLVANIA.—The Canada oats grew strong, large heads, well-filled, and weighed 34 pounds per bushel. From four quarts the yield was 3½ bushels, no fertilizer used. *Erie:* Have grown the white Schonen oats and commend them highly.

TENNESSEE.—*Marshall:* The Fallow oats surpass anything in their line that ever came to this State, both as to quantity and quality.

TEXAS.—*Waller:* The red rust-proof winter-oats from the Department yielded 18 bushels of excellent grain. *Williamson:* The yield of the four quarts of Sandy oats was good; believe the variety will prove valuable in this State.

UTAH.—*Juab:* The white Schonen oats proved quite a success, weighing 4 to 6 pounds more per bushel than the ordinary oats.

VERMONT.—*Washington:* The Somerset oats were distributed among the farmers; all report them a success; a great yield and heavy oats.

VIRGINIA.—*Patrick:* The oats from the Department produced a fine crop, 61 pounds to 1 of seed.

WISCONSIN.—*Manitowoc:* The white Schonen oats from the Department gave good returns and weigh well. *Outagamie:* The two quarts of Somerset oats yielded eighty quarts. *Waupaca:* The two quarts of white Schonen oats yielded 122 pounds, weighing 41 pounds to the bushel. *Washington:* Schonen oats excel all other varieties in yield and weight of grain. The yield on my farm was 82 bushels per acre.

RYE.

ILLINOIS.—*White:* The yield of the white winter-rye received from the Department was large and the grain excellent.

KANSAS.—*Mitchell:* From the four quarts of rye were harvested 3 bushels of fine grain.

TENNESSEE.—*Coffee:* The two quarts of rye received from the Department produced 4 bushels, the best yield ever known here. *Robertson:* The four quarts of winter-rye received from the Department produced 2¼ bushels, good in quality, the grain very large and plump.

CORN.

The testimonials as to the worth and prolific qualities of the "Department corn" are so numerous, that we have simply selected three counties in the State of Kansas to furnish these experiments for our annual report. This State has a variable soil, and while the northern and western portions experience all the rigor of the keen, biting, and severe winter winds of the great Northwest and similarly produce, the southern and southeastern localities often feel the soft, balmy airs of the South. The valleys of the Neosho, Noneskah, Shawacaskah, and Arkansas Rivers yield most of the products of the Gulf States, including cotton.

A correspondent, writing from Nemaha County, Kansas, says of the Runners' yellow corn, that "it did well. I got enough to plant forty hills. Grasshoppers being in such large numbers, planting was deferred until the 17th of May; the pests continued so thick that I did not commence cultivating till late, and then it was meager, yet the yield was good and the quality good."

From Osage County, we are told that "the West Chester corn is simply splendid; yield, at least 100 bushels per acre."

From Mitchell County, a correspondent writes that he "planted the corn we sent on June 12. It ripened September 15, and yielded 75 bushels to the acre; ears, long, and from 16 to 18 rows each. If it had been planted earlier, and in older ground, the yield would have been fully 100 bushels per acre."

JUTE.

GEORGIA.—*Chatham:* I planted the seed broadcast, and in twenty-four hours it had germinated. I was compelled to thin out the plants several times. They grew perfectly straight, and sent out but few branches. As fall approached, they blossomed and developed their seed-pods perfectly, the frost finally ending their growth. At this time the stalks ranged in height from 6 to 10 feet, the thickest being three-fourths of an inch in diameter. Others, to whom I gave seed, reported that their plants grew higher than 10 feet, being over an inch in thickness. I observed no defects in the plants. In cases where severe winds blew, I often found the plants blown over, though they stood the effects of the wind better than corn-stalks. I am satisfied it can be made a profitable industry.

LOUISIANA.—*Saint Landry:* The experiment with jute-seed convinced me that the plant is well adapted to this soil and climate, and that the seed will mature when planted any time from the 1st of April until the middle of October. The yield of seed would be about 200 pounds per acre. *Caddo:* In April, 1873, I had a piece of land plowed and prepared for planting the seed. It was a stiff, alluvial soil, on Red River, some fifteen miles north of Shreveport and a trifle south of the thirty-third degree of north latitude. The seed were sown broadcast, and the plants received no cultivation. The stalks grew from 12 to 14 feet high, producing a large quantity of seed. In the latter part of October, I cut stalks enough to form a bundle some 3 or 4 inches in diameter, placing them in Red River water to rot, the water being of a muddy, reddish color. The process of rotting was much slower than I expected, from the articles I had read upon the subject. The bundle was left in the water several weeks before the rotting of the outer bark was completed. The product was a soft, fine, yellow fiber, which could easily be peeled from the stem in long strips. The quantity of fiber from a stalk I considered large. The stalks may have been too green when I cut them, and this fact may account for the slow process of rotting. The land on which I had sowed the jute-seed was, the next year, 1874, planted in cotton, and, to the surprise of every one on the plantation, the "jute land," as it was called, produced a *remarkably* large crop of cotton; the best cotton in the whole place. This year, the "jute land" was planted in corn, and the crop is superior to any other corn on the plantation or in the neighborhood. The land has been, in some manner, greatly improved for the production of both corn and cotton. The jute-stalks remained on the ground, and were burned in the spring in preparing the land for the plow.

THE GARDEN.

In the distribution of vegetable seeds by the Department, there is great and diversified experience obtained. The tomato, growing finely and producing largely in one locality, is a failure in another, though having similar soil and similar climate. The onion, the beet, the bean, the pea, &c., experience like results, caused by the vicissitudes of the reason, as well as by widely-varied modes of culture. These opposite results are a mystery, of which a satisfactory solution is desired. In the planting, the growth, and the gathering, the miniature and prospective farmers of our country obtain the primary knowledge of agriculture, and seek by labor and experiment to sift the causes of these contradictory productions of climate and soil. The testimonials which are herewith presented give evidence of the character, worth, and prolific yield of the Department seeds; in many, many instances, contrary results having previously been reported:

ALABAMA.—*Fayette:* The seed of the improved Brunswick cabbage was sown in a box on the 14th of February, and transplanted about the 10th of March in rows 3 feet

apart each way. They were manured with rotted stable manure and duly cultivated at intervals of about ten days, the soil being thoroughly pulverized until the middle of July. The yield far surpasses that of any other cabbage I have ever seen. From about one-fourth of the seed sent I raised 400 cabbages. Many of the solid heads weighed 5 to 7 pounds, and this, too, though raised during a season of unparalleled drought through June and July. No doubt the production would be much greater in this climate if the plants were transplanted about the middle of September.

The seed of the large round giant Madeira onion was sown in drills on small ridges, 15 inches apart, very thickly, the 2d of February. The ground was well pulverized and manured. In due season the plants appeared. They were so thick that many were, from time to time, removed. As is the case in southern horticulture, I imagined that the production would be nothing more than small sets for next year. In a short time I was astonished to find the roots fast increasing in size, so that I removed about seven-eighths of them. Even this left them too thick. I let them remain, however, and cultivated them frequently with a plow-hoe. I gathered them on the last day of July, and, where they were not too thick, many of the onions weighed from 5 to 9 ounces. *Dallas:* The dwarf branching peas are large and fine flavored; think them a great acquisition.

ARIZONA.—*Yavapai:* The Alpha is a splendid pea; a fine bearer, and very early. The ox-heart cabbage is a fine grower; large, firm heads; never saw better. The yellow flat-podded bean grew luxuriantly and bore abundantly.

ARKANSAS.—*Arkansas:* The yield of the speckled Valentine beans was tremendous, and the flavor is excellent. They are well suited to our soil and climate. The red radishes are excellent. The trophy tomato grows large, and is an excellent variety. The drum-head cabbage fine size and well flavored. *Pulaski:* The dwarf black wax-beans are the earliest and best I have seen. The lettuce is an improvement on anything we have. *Pope:* The trophy tomato is very productive and excellent; the Egyptian beet a good variety; of excellent flavor. *Hempstead:* The radishes, beets, pease, and lettuce are as fine as I ever saw. *Ashley:* The black wax-pea is a complete success; the crooked-necked squash the finest I ever saw; the French breakfast radish excellent.

CALIFORNIA.—*Fresno:* The early white turnip-radish did exceedingly well. The long green cucumber grew splendidly and produced abundantly. The Grant tomato is an abundant bearer, and a splendid variety. The dwarf kale succeeded admirably, and proves an excellent variety; the crooked-neck squash an abundant bearer and an excellent variety.

COLORADO.—*Weld:* The results from the seeds sent by the Department have dispelled all doubts as to the value of its work in seed-distribution.

CONNECTICUT.—*Middlesex:* The scarlet radish is the best I have raised for twenty years. Nothing could be better than the early Bassano beet. *Fairfield,* (Georgetown:) The trophy tomato is unsurpassed in quantity and flavor. The red Wethersfield onion produces a large crop—crisp, and of fine flavor. The corn, cucumber, and all the vegetable seed from the Department have yielded more abundantly in my garden than any seed in thirty years' experience in gardening. (Norwalk:) The squash is a superior variety; the yield immense. The carrots large in yield, and superior for table use; drum-head cabbage the very best; extra large heads, some weighing 20 pounds; beets, also the very best; consider the radish the best variety in the world, and would not grow any other; the pease ahead of anything I ever raised; quality A No. 1.

DAKOTA.—*Hutchinson:* Stowell's evergreen corn is a great success; no suckers to the stalks; yields well, and is of first quality. The mountain-sprout watermelon is very early, and of delicious flavor. The early flat Dutch turnip is quite early, yields well, and is of fine flavor.

FLORIDA.—*Hamilton:* The early Valentine beans are very prolific. The flat Dutch cabbage a perfect success. *Suwannee:* The garden-seeds from the Department, especially the pea, bean, and cabbage seed, gave ample satisfaction. *Escambia:* The flat Dutch cabbage are a very desirable variety. *Columbia:* The sugar-corn is excellent; have not seen anything to equal it in twenty-five years.

GEORGIA.—*Lowndes:* Stowell's evergreen corn is perhaps the sweetest we have ever had for the table.

ILLINOIS.—*Vermillion:* The early Valentine beans excel in yield. The American flat Dutch cabbage grew very large; never saw better. The scarlet radish did well; fine in quality. *Mercer:* The white wax-bean and Darling's sugar-corn excel anything of the kind I have ever raised. *Bureau:* Darling's sweet corn is early and very good; the Concord pole-bean very desirable; good in quality. *Moultrie:* The corn very prolific; tomatoes fine; beets very large; lettuce the best I ever raised; pease and cucumbers good, and cabbage very good. *Crawford:* The Champion of England pea is more productive and better flavored than any other pea I have ever cultivated. The long Cayenne pepper is well worth cultivating.

IOWA.—*Lyon:* The dwarf branching pea is the most productive pea ever grown in

this vicinity. *Floyd:* The drum-head cabbage is the best variety I ever saw; every one a good head on a short stem.

KANSAS.—*Jewell:* The early Simpson lettuce proved the best variety I ever saw. The early Wyman cabbage made larger heads than any other early cabbage in the vicinity. In seed distribution the Department is doing a good work. *Osborne:* The seed distributed by the Department germinated well. The gardens trying it universally thrived, and our people are husbanding the seed produced for the future. *Butler:* The varieties of garden-seeds from the Department, with a single exception, did exceedingly well. *Mitchell:* The garden-seeds sent by the Department, with but one exception, grew wonderfully. *Douglas:* The pumpkins and watermelons were rare kinds. The black wax-bean is the favorite. *Marion:* The crook-neck squash, ice-cream watermelon, late drum-head cabbage, long scarlet radish, dwarf German kale, improved cantaloupe, trophy tomato, and Champion of England pea all grew and yielded bountifully. *Jefferson:* The seeds sent out from the Department were worth thousands of dollars to the people of Kansas. *Barton:* The dwarf branching-pea is one of the best varieties; a good bearer, and of excellent flavor. The dwarf white bean is the finest I ever saw; it cannot be excelled. *Cherokee:* The trophy tomato was the largest and finest I ever saw. The yellow onion, and the beet and cabbage yielded abundantly and were very fine in quality. *Dickinson:* The Champion of England pea gave a splendid yield, the best I ever tasted. The wax-beans are the most delicious of snap-beans; early and prolific. The excelsior watermelon is as good in quality as any melon I ever ate.

KENTUCKY.—*Hickman:* The sugar-corn grew remarkably well, and made large, well-developed ears; the wax-bean is a valuable acquisition; the Bassano beet proved worthy of cultivation. *Fulton:* The olive-rose radish is very tender and of excellent flavor; the Belgian carrot an excellent variety for the table; the Simpson lettuce the best variety I ever saw; the evergreen sweet-corn very early, prolific, and well flavored.

LOUISIANA.—*Orleans:* The garden-seeds gave great satisfaction. Could raise two crops of the sugar-corn in one season by planting March 1. The brown speckled bean yielded bountifully—as prolific as any bean of that class I ever saw. The seeds did much better than those usually obtained here of the seed-venders.

MARYLAND.—*Dorchester:* Stowell's evergreen corn surpasses every other thing planted in the way of corn; fine in size and flavor, and free from the worms that prey upon the kernels of sweet-corn. The Valentine bean is superior in quality to any string-bean. The dwarf branching pea yields heavily, and is of superior flavor. The white wax-bean surpasses all pole-beans ever raised in this section.

MASSACHUSETTS.—*Middlesex:* The Boston market celery splendid. The white wax-beans prolific and excellent.

MICHIGAN.—*Charlevoix:* The two quarts of pease produced 40 quarts; the best pea I ever grew. *Ionia:* The short-stem Brunswick cabbages are the best I ever raised; heads firm and solid. Raised over 300 heads, weighing 12 to 20 pounds per head. Gave away over 100 heads for seed. *Lenawee:* Of the seeds from the Department, the tomatoes were the finest I ever saw; the sweet-corn as good as any I ever tried; the beet cannot be beat. Over three bushels of excellent onions were produced from one paper of seed. The cabbage the largest, tenderest, and finest I ever saw. *Ottawa:* The evergreen sweet-corn produced a splendid crop, and ripened well.

MINNESOTA.—*Nobles:* The early drum-head cabbage did remarkably; never raised so nice before, and will never raise any other variety. The sweet-corn and pease are excellent. Every kind of seed sent did well, except that of the giant rocky onion. *Aiken:* The Bishop dwarf marrowfat pea did remarkably well; produced fine-sized pods, with very finely-flavored peas; matured early in the season; yielded four distinct crops, and continued in blossom until frost. The Fiji tomatoes did better than any other tomato ever raised here, weighing from ¾ to 1¼ pounds each. The blood-red beets did well; the roots were remarkably large, some of them measuring 26 inches in circumference. The drum-head Savoy cabbage is the only variety producing heads worthy of notice. The white wax-beans did admirably; produced successive crops during the whole season. The long, green cucumber produced abundantly, but could not ripen for seed.

MISSISSIPPI.—*Chickasaw:* The red Weathersfield onion yielded finely. *Madison:* McLean's "Best of all" pea is incomparably the finest pea, being prolific, hardy, bearing a long season, and, for the table, unsurpassed.

MISSOURI.—*Reynolds:* Most of the vegetable seeds from the Department proved to be a vast improvement on the kinds generally produced here. *Carroll:* The garden-seeds from the Department were a perfect success, producing the finest vegetables I ever saw. Think every seed planted came up. *Pettis:* The perfected tomato-seed produced the finest tomatoes I ever saw. The dwarf branching peas were splendid. The collection of seeds, taking all in all, were a grand success. *Cooper:* The garden-seeds from the Department did well. The peas were the largest and the tomatoes the largest and best I ever grew; the lettuce splendid, and the carrots large and fine for cooking. *Jasper:* The garden-seeds from the Department distributed in this county were good

and of good varieties. The sentiment of the county, as the result of trial, is, "Long live the Department of Agriculture." *Daviess:* The early Bassano beet proves very early, and of good size and fine flavor. It stands considerable freezing in the early spring without injury. In my opinion, it is the best early beet. *Cass:* The turnip-seed from the Department produced very fine turnips. *Iron:* The doubled curled parsley is growing beyond all description; compared with it, no other variety is worth cultivating.

NEBRASKA.—*Furnas:* The long green cucumbers are the best bearers I ever raised. The victor and trophy tomatoes bear beautifully. The parsnips did splendidly. *Sanders:* The sugar-parsnips are superior in every way to any other parsnip I have ever seen. In size they are enormous; most of them from 4 to 6 inches in diameter and from 2½ to 3 feet long. The green citron-melon is the best early melon I have Cook's favorite tomato has, with me, no equal. The white Moscow pea is the most prolific bearer, and the best in quality. The blood turnip-beet large, smooth, and excellent. *Howard:* The early blood turnip-beets grew to a large size and are of excellent quality. Some of them grew to the enormous size of 30 (?) inches in diameter. The red Weathersfield onion is the best that can be produced. Have never seen anything to equal the ice-cream watermelon.

NEW HAMPSHIRE.—*Merrimack:* The parsnips from seed from the Department beat anything I ever saw in size, quality, and flavor. The beans grew well and are an excellent string-bean; peas very early and of extra quality; sweet corn the best I ever saw.

NEW JERSEY.—*Bergen:* The seeds sent by the Department last spring turned out splendidly, especially the corn, pease, and beets.

NEW YORK.—*Saratoga:* The McLean peas are a luscious variety; the extra early beets excellent in quality; the red Weathersfield onion very fine; the mammoth red tomato, a choice variety. Several heads of the Brunswick short-stem cabbage weighed 11 pounds each, choice in quality. Stowell's evergreen corn is not equaled by any other variety. *Cayuga:* The drum-head lettuce is the best we have had. The trophy tomato a large, strong grower of splendid quality. All the seeds germinated well. *Schoharie:* Crosby's early corn is a desirable variety. The bush butter-bean is very productive, and the beans very tender and of fine flavor. The white marrow-pea is a good bearer and of rich flavor. *Wyoming:* All the seeds from the Department have proved true to the name, and have done well. *Sullivan:* The little gem pease very delicious and early; black wax-beans very good; Grant tomato the best in yield I ever had, and very delicious. The long blood-beets yield heavily and are very good in quality. Early scarlet radish and parsley very good.

NORTH CAROLINA.—*Randolph:* The largest pumpkin, produced from the seed from the Department, I had measured and weighed; it measured 5 feet in circumference and weighed 78 pounds. *Buncombe:* Of the seeds from the Department, the beets were all that could be desired; never had any lettuce before that came up and grew half so well, or that was half so good. The dwarf blue imperial peas were large in growth, of luxuriant foliage, immense in yield, and of a delicious quality.

OHIO.—*Licking:* Distributed some of the seeds from the Department, and the reports are very favorable. Of those I planted, the crooked-neck squash yields well and is the best in quality we ever tasted; am distributing the seed. The blood turnip-beet is the best beet ever produced here. The long scarlet radish did well; good in quality and much prized by many. *Mercer:* The seed from the Department came up well without any exception, and nearly all the kinds have done well. Have always found that the seed distributed by the Department, when properly cared for and cultivated, has given great satisfaction. *Wayne:* The black wax-beans made a splendid yield. The peas proved good, though the season was unfavorable.

PENNSYLVANIA.—*Bradford:* The red speckle beans did well; are adapted to our soil and climate, as are the parsnip and the long scarlet radish. McLean's little gem pease, and the cucumber and lettuce seed, did well. *Wyoming:* The red Weathersfield onion cannot be praised too highly. The long blood-beet is very good. Saxton's Alpha pea is the most prolific and best-flavored pea we have ever tried. The white wax-bean very good.

RHODE ISLAND.—*Kent:* The sugar-corn is remarkably sweet and juicy; the beans very quick of growth and prolific.

SOUTH CAROLINA.—*Beaufort:* The Egyptian beet proved the best I have even cultivated; plenty of heads 15 to 18 inches through—solid as a stone. *Colleton:* All the seed from the Department gave satisfaction except parsley. *Darlington:* The sugar-corn came upon the table in just seven weeks from the time of planting, and was the best I ever tasted.

TENNESSEE.—*Coffee:* The garden-seeds from the Department all did well. From one paper of red Weathersfield onion-seed I gathered one-half bushel of sets. The red mangel-wurzel is a surprise to the whole community. *Lincoln:* The garden-seeds did well, all of them. *Hamilton:* McLean's advance pea is the best ever raised here. From the tomato-seeds I raised and sold 100 bushels of tomatoes. *Trousdale:* Crosby's

early corn is first class. The black wax-bean and the long, dark blood-beet are very fine; the radish, excellent. *Jackson:* The distribution of seeds by the Department is of great benefit to the farmers. At but little expense to the Government, many kinds of improved field and garden seeds are introduced, which greatly increase the yield.

TEXAS.—*Limestone:* The sugar-corn is the most delicious I ever ate. The beans were early, and yielded largely. The yellow-bush squash produced abundantly, and the tomatoes did finely. *Uvalde:* The Valentine beans succeed well—a choice variety here; the Brunswick good, and well suited to this climate. The early green sugar-corn produced well, and is a great favorite here. *Grayson:* The onions were of the quickest growth I ever saw—ripe in June. I measured one that was 3 inches in diameter; flavor, fine. *Robertson:* The Philadelphia extra early pease are preferable to any I ever cultivated. The dwarf black wax-beans are very valuable; had some growing, with a full crop on, in the middle of November. The Canada victor tomato did finely. *Medina:* Tilden's improved tomato is, without doubt, the best for this climate. The Dan O'Rourke pea very valuable for this section *Bastrop:* The black wax-bean is the best I ever saw. Crosby's early corn, excellent for this climate. The early frame cucumbers did very well. *Hood:* The squash is an excellent variety; the finest ever grown in this county. The beets, onions, &c., were good.

UTAH.—*Salt Lake:* The lettuce very early, and does not run to seed as soon as other varieties; some of the finest ever grown in Utah. The dwarf branching pease very prolific. Should be sown very thin in the rows, as they have a faculty for throwing out innumerable branches. Everett's evergreen corn is delicious for the table.

VIRGINIA.—*Buckingham:* The seeds did splendidly, especially the beets and the beans. *Fairfax:* The O'Rourke pea is a superior variety; every early, and a very good bearer of long, well-filled pods. The long green cucumber is truly excellent.

WEST VIRGINIA.—*Jackson:* The Brunswick short-stem cabbage is one of the best kinds introduced into this section. The McLean little-gem pea is considered quite an acquisition; it is the best kind here. The double-curled parsley is also the best we ever had. The red Weathersfield onion grew to a large size, a few of the largest measuring over 4 inches in diameter.

WISCONSIN.—*Richland:* The mammoth Chili squash grew to an immense size; some specimens weighed 75 pounds. The dwarf black wax-beans are superior to any bean we know of. *Waukesha:* The General Grant tomato yields immensely, and is fine in shape and flavor; the best I have ever seen; the white solid celery yields well, and is crisp and fine; unequaled in this section; the fine sugar-parsnip grows well, and is very good and sweet; the orange-watermelon is a good bearer and a very fine, sweet melon. *Walworth:* The ten kinds of garden-seeds sent by the Department did well. The beets, the best we ever raised; some of them 22 inches in circumference.

POPULAR VARIETIES OF FRUITS.

BY F. R. ELLIOTT, CLEVELAND, OHIO.

In several former reports of the Department of Agriculture the writer has given descriptions of popular varieties of fruits, with illustrations of such as were new or comparatively unknown. The last of this series was published in 1867, and it has been deemed desirable to present a brief analysis of the results of recent experience and improvement. In resuming the subject it seems best to repeat the lists commenced in the annual reports for those years, and note any indications suggested by subsequent trials of fruit-growers.

The varieties of apples needing no change in the descriptions given in those volumes, are American Summer Pearmain, Benoni, Early Harvest, Golden Sweeting, Gravenstein, Hubbardston Nonsuch, Keswick Codlin, Lady Apple, Maiden's Blush, Newtown Spitzenberg, Rawles's Janet, Rambo, Red Astrachan, Red June, Rhode Island Greening, Roxbury Russet.

The results of experience and observation in the intervening period call for additional remarks respecting other varieties of apples.

Baldwin.—In all of the strong soils and cool regions of the North, this

is to-day a leading profitable variety; but it will not pay to grow south of the parallel of Cincinnati.

The *Fall Pippin* needs no change of remark as to its value, but when grown near the latitude of Cincinnati, or in deep alluvial soil, it becomes tender, and matures its fruit too early to be profitable.

Fall Wine.—The remarks in 1862 are correct, but it is but little known, and rarely can it be found in the nurserymen's catalogues.

Northern Spy.—This variety is extremely valuable in New York, Northern Ohio, Michigan, and some parts of Illinois; but in the southwestern fruit-sections, and some parts of Illinois and other States of the Ohio valley, and in Kansas and Nebraska, it is not strictly hardy, and ripens too early to keep well.

Peck's Pleasant, *Porter*, and *King of Tompkins County*, are all valuable when extremes of climate do not prevail. The two former should be more generally tried in Wisconsin, Iowa, and other northern localities.

Smith's Cider has gained in estimate of value among fruit-growers. It is not especially a cider fruit, but is a regular bearer, a healthy, hardy tree, the fruit of good size, and almost always fair and regular in form.

Tolman's Sweeting, *Wine Sap.*—These two varieties keep up their character for hardiness and bearing, and are among the most profitable.

Yellow Bough.—This variety, with the superfluous prefix of "large," is one of the most valuable and popular of sweet summer apples. Twenty-three States in the American Pomological Society star it for culture.

Yellow Bellflower and *Yellow Newtown Pippin* are two valuable varieties for southwestern fruit-culture.

Belmont, *Dyer*, *Garden Royal*, *Jonathan*, *Swaar*, *Wagener.*—These comprise a choice collection for a private garden in any region near latitude 42°. They are none of them above medium in size, all of the first quality, and regular, productive bearers.

Red Canada, *Westfield*, *Seeknofarther.*—Throughout all the middle territory of the Northern and Northwestern States, these two varieties are very popular and successful in their growth, bearing, quality, and keeping of the fruit.

Leaving the work of former years, we come now to describe a few varieties in each class that have been well tested, and sustained good reputation.

Ben Davis.—Synonyms: New York Pippin, Victoria Pippin, Victoria Red, Red Pippin, Kentucky Pippin, Baltimore Red, Baltimore Pippin, Baltimore Red Streak, Funkhouser, Carolina Red Streak.

Fruit—size medium to large; form roundish, truncated conical; sides unequal; color yellowish, ground almost entirely overspread, splashed, and striped with two shades of red, and dotted sparsely with dots; stem medium in length, rather slender; cavity narrow, deep, and russeted; calyx partially open; basin slightly corrugated, abrupt, broad; flesh tender, whitish, moderately juicy, subacid; core varying.

This is an old variety, the origin of which has not yet been traced. It was widely disseminated years since as New York Pippin, but as it fruited in various sections, the other local names came to be known as this apple. Downer and Allen, of Kentucky, both stated that very old trees were then known. The tree is hardy, a free grower, upright in form, with dark red or grayish red wood; blooms late in the season, matures early, and produces abundantly. Fruit fair, keeps and carries well from December to March, and is therefore very popular as a market sort throughout the South and Southwest.

Bethlemite.—This apple was brought into notice some twenty years since by a grower (name lost) in Bethlehem Township, Ohio. It resem-

bles the Newtown Spitzenberg, and somewhat the Cogswell. The tree is upright, strong, and stocky in growth, short-jointed, with wood downy, and of a dull, reddish-brown color.

The fruit is medium in size, nearly oblate, inclining to conical, and regular; color pale yellow ground, striped, shaded, and splashed with dark and light red, grayish tinge, with dots light and dark; stem short and slender; cavity large, much russeted; calyx half open; basin broad, slightly corrugated or furrowed; flesh yellowish white, compact yet tender, mild subacid, and aromatic; core small. In quality it is of the best, while its keeping character is said, by those who have grown it, to be good to March.

Buckingham.—Synonyms: Queen, Fall Queen, Winter Queen, Kentucky Queen, Lexington Queen, Frankfort Queen, Ladies' Favorite of Tennessee, Byer's Equinetely, Ox-eye, Bachelor, Merit, Blackburn, Henshaw, Sol Carter, Ne Plus Ultra, King, Red Gloria Mundi, and Red Horse.

Fruit—size medium to large; form roundish, oblate, inclining to conic; color greenish or grayish yellow, mainly covered with shades of red, marbled, shaded, slashed, and striped, many brown dots; stem short; cavity broad, deep, slightly russeted; calyx closed, segments erect, pointed; basin large, deep, slightly furrowed; flesh yellowish, rather coarse, and open, tender, juicy, mild, subacid; core small; quality "very good" to "best."

Tree healthy, moderately vigorous, half-spreading, forming a round head of well-balanced branches and fruit-bearing stalks. It is one of the oldest varieties known to be profitable, either for market or table use, in the Southern and Southwestern States. It is not advised where the Jonathan, Red Canada, etc., are successful. The fruit grown in Kentucky often keeps until February.

Chenango Strawberry.—Synonyms: Sherwood's Favorite, Strawberry, Buckley, Jackson, Smyrna.

Fruit—size medium; form oblong truncated, conic, indefinitely ribbed; color, yellowish-white, shaded, splashed, mottled with light and dark crimson red over most of the surface, a few light dots; stem short, small; cavity acute, sometimes uneven; calyx mainly closed, segments erect, point; basin broad, rather abrupt, slightly furrowed; core medium to large; flesh white, tender, juicy, mild, peculiar, slightly aromatic, subacid; quality "very good," almost, if not quite, "best;" season, September, October. Tree, a vigorousspreading grower; the wood somewhat downy, and of a light reddish brown.

This variety originated in Madison County, New York, and the period of ripening is given for that section. South and southwest its maturity would be much earlier. It is a fruit not so much of value for market as for its own intrinsic merit. Where known it is esteemed.

Cogswell.—Synonym: Cogswell Pearmain.

Fruit—size above medium; form roundish, oblate, regular; color rich yellow, nearly covered with red, marked and streaked with bright red, and pretty thickly sprinkled with dots; stem short, rather slender; cavity large and moderately deep, thinly russeted; calyx small, nearly closed; basin small, shallow; core small; flesh yellowish, fine-grained, juicy, slightly subacid, tender, and richly aromatic. Very good to best.

In Connecticut where it originated, and whence our first notice of it comes, say 1798, in Northern Ohio and Michigan it hangs late upon the tree, and when gathered bears carriage almost without injury, and is in eating from December to March. The tree is a hardy, healthy

grower, the wood dark reddish brown, and downy while the shoots are young, becoming almost purplish black the second year. The first record we have of this fruit before the public was at the Massachusetts Horticultural Society in 1816 or 1818. The writer first knew of it in the hands of a Cogswell in the town of Parma, Ohio, and being shown the fruit in April he obtained grafts and buds, and propagated and sold trees to go West. There is now a variety grown in Wisconsin under name of Walbridge which, as shown by specimens brought to the writer, was similar to the Cogswell. If not the same, it has peculiarities that would lead to its origin from that variety.

Duchess of Oldenburg.—Synonyms: Smith's Beauty of Newark, New Brunswick.

Fruit—size medium; form regular, roundish, oblate; color yellowish ground, washed and streaked with red, deep clear red where fully exposed to the sun; stem short, projecting beyond the surface; cavity broad, deep, abrupt; calyx large, half open, with recurved segments; basin medium; depth broad; flesh whitish, tender, crisp, juicy, sprightly, subacid; ripens in the middle sections in September, but will keep to November, and the farther north it is grown the longer its period of maturing.

This apple, of Russian origin, is vigorous in growth, with a bold, thick foliage, forming a roundish upright spreading tree, requiring little or no pruning, producing abundantly and seldom failing. It is generally acknowledged as a fruit that, wherever planted, will prove successful and satisfactory. The young wood is of a reddish tint, stout, and with full, round oval buds. A blue bloom is often on the fruit. It is a valuable market sort, and although not of first quality for the dessert, yet is passably good, while as a cooking-fruit it has few superiors.

English Russet.—Synonym: Poughkeepsie Russet.

Fruit—size medium; form roundish, slightly conical, and also slightly angular; very regular; color dull greenish-yellow, mostly covered with russet, which is thickest near the stem; calyx small, closed, with pointed reflex segments; basin open, round, regular, of moderate depth; stem small, short, about even with the surface of the fruit; cavity narrow, pretty deep; flesh, yellowish-white, firm, crisp, yet tender, with a pleasant mild subacid flavor, classing it as "good" to "very good." Its eating period varies from October to April or May, according to climate. It is regarded as one of the best of keepers, and very productive. The trees grow very upright, forming what is termed an upright, rounded head. The young wood is of medium size, smooth, and of a reddish-brown.

Evening Party.—Fruit—size small and medium; form oblate; sides often unequal; color a rich, yellow ground, mostly shaded, striped, and splashed with bright red, becoming very dark when fully exposed to the sun; many light dots toward the calyx, or blossom end; stem short, hardly even with the surface of the fruit; cavity round, regular, deep, acute, occasionally slightly russeted; calyx half closed, with reflexed segments; basin broad, rather deep, and even; flesh whitish, tender, juicy, crisp, with a brisk vinous saccharine, aromatic flavor; one of the best, counting size, beauty, and quality, known for the dessert. Tree vigorous, upright, roundish, spreading, with slender twigs, or small branches. It originated in Berks County, Pennsylvania, and was first introduced and described to the public by the esteemed Dr. W. D. Brinkle, of Philadelphia.

Fallawater.—Synonyms: Pim's Beauty of the West, Falwalder, Fornwalder, Pound, Tulpehocken, Mountain Pippin, Baltimore (erroneously,) Fall de Walldes, Brubacker, Fallawalder, Winter Blush, Green Mountain Pippin, Falder, Molly Whopper, Dutch Pippin.

Fruit—size large; form globular, slightly conic; color yellowish, dirty green, shaded with dull red in the sun, and sprinkled with large gray dots; stem short, cavity deep; calyx small, closed; basin shallow, slightly plaited; flesh greenish-white, moderately juicy, half tender, pleasant, mild, subacid, but deficient in flavor; season October to February; tree a very strong upright, spreading grower, large foliage, productive, and profitable for market or drying.

Fameuse.—Synonyms: Pomme de Neige, Sanguineus, Snow Chimney, Snow.

Fruit—size medium; form roundish, slightly flattened; color, groundwork pale yellowish, mixed with streaks of pale red on the shady side, with blotches, short stripes, and deep red where fully exposed to the sun; stem slender; cavity narrow, yet even and smooth; calyx small, with closed reflex segments; basin open, shallow; flesh clear white, sometimes tinged with pinkish-red near the skin, very tender, juicy, with slight perfume; tree moderately vigorous, upright, round-headed in form, young shoots reddish-brown, slender, very hardy, and a regular bearer.

This is probably an old French variety, as the first known of it was through the Jesuits, who settled in Canada. In the Northern and Northwestern States it has proved one of the most valuable in every respect. While its fruit comes into eating late in November, it has been kept perfectly until April. There is a variety named Striped Fameuse that differs little from this, except it is less highly colored, and more striped than shaded.

There is also a seedling, doubtless of the Fameuse, named Shiawassee Beauty, which much resembles the old Fameuse in every respect. Some think it will prove larger in size and a better keeper, but this requires time to determine.

Ohio Nonpareil.—Synonyms: Myer's Nonpareil, Western Beauty (erroneously,) Cattell Apple, Rusty Core.

Fruit—size medium to large; form roundish, oblate; color yellow, shaded, marbled and splashed with two shades of rich red, thinly sprinkled with light and gray dots; stem medium, rather slender; cavity broad, deep, regular; calyx rather large, half open, with short reflex segments; basin medium; flesh yellowish white, fine-grained, tender, juicy, rich, slightly aromatic, subacid; quality very good to best.

Trees, while young, are very vigorous. As they get age, they are spreading, upright, with a world of fruit-spurs, requiring no thinning of the wood, but the fruit is the larger and better for thinning out one-quarter to one-third at an early stage of growth. The young shoots are stout, smooth, and of a rich, dark, reddish brown color. The first known of this variety was a specimen sent from Massillon, Ohio, to F. R. Elliott, who figured and described it in the Ohio Pomological Society's Transactions. In Northern Ohio, Central New York, and Michigan it ripens in October and November, and is counted by those who have it as one of the best and most valuable of autumn apples for table or market.

McAfee's Nonesuch.—Synonyms: McAfee's Red, Large Striped Winter Pearmain, Striped Pearmain, Striped Winter Pearmain, Striped Sweet Pippin, Snorter, Nonesuch (incorrectly,) also Hubbardston Nonesuch (incorrectly,) Zeeke, Missouri Superior, Gray's Keeper, Storr's Wine, Vallandigham, White Crow, New Missouri, Park's Keeper, Missourian, and Missouri Keeper; the application of both of these last names to the McAfee's Nonesuch is as yet questioned.

Fruit—size medium to large; form roundish, inclining to oblate; color

yellowish ground, shaded, striped, and splashed with shades of red, few gray dots, often with a thin bloom; stem medium, both in length and size; cavity large, open, deep, often with slight russet; calyx closed; basin open, shallow, even, regular; flesh whitish yellow, juicy, crisp, pleasant, mildly subacid; quality "good" to "very good;" season winter. Tree hardy, vigorous, spreading, and productive of an even, fair fruit, keeping well.

This variety came to the writer many years since from Mr. Allen and others in Kentucky as the Large Striped Pearmain. When describing fruits, many years after, I dropped the "large" word, as there was then known no other striped Pearmain. At the American Pomological Society's meeting in 1871 the whole matter was passed upon by a committee, which gave the synonyms, mostly as above, as belonging to McAfee's Nonesuch, and that it originated from seed in Mercer County, Kentucky, planted by George McAfee, somewhere about 1780 or 1782. Whether this is all right or not, we can only say it is only one of hundreds that to-day bear too many erroneous names.

Shockley.—Fruit—size small to medium; form roundish, conical; color pale yellow, overspread with rich red, small, inconspicuous dots; stem long, slender; cavity deep, acute; calyx half closed, with slightly reflex segments; basin somewhat ribbed or corrugated, regular; flesh yellowish white, crisp, juicy, slightly vinous, richly saccharine, agreeable to the palate; season late winter and early spring. Tree moderately vigorous, upright, open head, bears young and regularly; young wood reddish, tinged with gray. This variety is one of the most profitable and deservedly popular throughout the Southern States.

Tetofsky.—Fruit—size medium; form nearly round, slightly oblate conic, smooth; color a pale yellow ground, beautifully striped with red and overspread with a fiber-like whitish bloom; flesh white, crisp, juicy, slightly acid, and with an agreeable fragrance, and early ripening; tree short, vigorous, upright, with a broad, distinct foliage that marks it at once to the beholder. It is very hardy, an early and regular bearer, and forms a roundish, conical, open head, with branches abounding in fruit-spurs. This is an old apple, and it is strange that it has not been more appreciated, especially by those who live in climates trying to the vitality of fruit-trees. It has been grown in Maine, in most of the northern localities in Canada, and nearly forty years since was fruiting in the garden of the revered Manning, at Salem, Mass.

The Fourth of July, with the synonyms of Siberian August, Stewart's Nonpareil, August Apple, and McAdow's June, resembles Tetofsky in the period of ripening and also in its fruit; but the tree, as it matures with age, is different. It may be a seedling of Tetofsky, our first knowledge of it being through its introducer, Mr. C. F. Jaeger, of Columbus, Ohio, who brought it out as a German apple, and gave it the name of Fourth of July, because in that section and climate the fruit was in eating condition at that time.

Wealthy.—Fruit—size medium; form roundish oblate; color whitish, yellow ground, shaded, striped, and mottled, sometimes being entirely covered with rich, deep-crimson red, many light dots; stem short, slender; cavity lightly russeted; calyx half closed; basin deep, abrupt, uneven; flesh white, fine-grained, slightly tinted next the skin, in deep-colored specimens with red; juicy, tender, vinous, subacid. Classed as "very good;" December to February.

This variety originated near Saint Paul, Minn., and is as yet little known. It is now about six years since it was first sent out, and it has so far borne general record as hardy.

VARIETIES RECENTLY INTRODUCED.

Annually there are numbers of new varieties, or old varieties with new names, introduced to the knowledge of the reading public. Too often it has been found that an old variety, well known to those so well trained in identification as Downing, Barry, Wilder, and others, has been brought out under a new name. Occasionally it happens that a new seedling has been carefully grown, and its originator is capable of stating from what variety of apple he obtained his seed, and how he grew it, and how it has fruited. But even allowing that the originator brings forward a new fruit equaling varieties already known, there is no test yet obtained by which the buyer and planter can rely upon the fruit, when the trees fully mature, as he now can upon many old sorts that have been tested for years, and of course it is impolitic for any but an amateur, who can afford to waste money and time for knowledge, to purchase or plant such new varieties. The prudent man who plants trees for their fruit, whether he plant a few in the garden, a small orchard, or upon a large scale for market, will be guided by a record of varieties that have been tested and proved profitable.

In this aspect of the case, I hesitate to do much more than merely name some of the new sorts that have been brought before the public, and that have a foreshadowing of value. I do this now to exhibit the interest that there is in fruit-culture, and the desire of many parties to make money from a seedling, whether it prove generally valuable or otherwise. I could make a list of over two hundred different-named apples brought before the public during the past ten years, but do not deem it desirable to do so. Nor should the work of originating new varieties be disparaged; for the man or woman who can to-day grow from seed, however fertilized, one variety of fruit that surpasses those that are known will make a name and fame never to be forgotten. I give below a list, selected from those called "new," *i. e.*, seedlings.

Ripley.—Under this name, with two synonyms, this was described in 1870 in Tilton's Journal and in the American Pomological Society's transactions for 1871, as an apple of size and quality to merit credit. It was stated to have originated in Madison County, Illinois. Nothing has been heard of it since.

Sedgwick.—This apple appeared in the American Pomological Society's transactions, in 1871, as from Centreville, Indiana, and as being large, handsome, and valuable. Who knows of it now?

The same author gave us *Schuyler's Sweet*, which, from the authority and description, a novice might have been induced to buy; but no further notice, to my knowledge, has been made of it. I once described *Mount Gilead Beauty;* and for the reason that it was sent me with a statement that the grower was disposing of it under that name, I did not advise its culture. I cite these facts here to show the uninitiated that they must not depend upon the first description of a new fruit because the author is a man familiar with fruit.

Otoe Red Streak was described in 1870 as a seedling of Nebraska by authority of R. W. Furnas. It has since been spoken well of. The *Hiawatha*, *Pewaukee*, *Semper*, *Newville*, *Noyes*, *Pride of Minneapolis*, *Mollie*, *Northern Blush*, *Sherman's Sweet*, and many more were described in 1870 and 1871, which are probably now out of existence, because there was not any superior excellence in them over known varieties to induce the growers of fruit-trees to try them.

And just here let me remark that many writers look more to the general interests of the people than to any ultimate pecuniary value the

descriptions of a fruit just brought out and advertised for sale will secure to the public. The writer, whenever he has described a new fruit, has done it to keep record in harmony, and never yet, unless he could certify its quality as best, has he expected to hear of it again. In 1873, *Cooper's Early White* was advised to be put upon the American Pomological Society's catalogue. It had been described then in one of our standard fruit-books over twenty years. *Congress*, an old, coarse apple, good to cook, but not to eat, grown in Massachusetts three-quarters of a century, was brought up in 1873 as a new thing; and so also the old *Fall Orange*, with its eight synonyms, was brought up in a public assembly of fruit-growers under the name of Holden. The *Milden*, sometimes blunderingly printed "Milding," is probably an early winter variety that may become widely and favorably known. It is said to strongly resemble Gravenstein in size, form, and color, and to be of quality to please. It is described in the American Pomological Society's transactions, 1873, as originating in Alton, N. H., and the tree is a strong, healthy, upright grower, bearing alternate years a fruit subacid, slightly aromatic, valued by those who know it.

The *Wythe, or Illinois Pippin*, is stated to have originated on the farm of R. Chandler, Wythe, Ill. The tree is described as hardy, vigorous, forming a round head, a late bloomer, a great bearer, and claimed by the originator to be the most profitable tree in his orchard. (We know not what the orchard contains.) The fruit is said to be medium in size, oblate in form, shaded, striped, splashed, and mostly covered with red; flesh tender, juicy, sprightly, subacid, and slightly aromatic; season, January to March.

The *Lanier* is said to be a new variety from Edgefield County, South Carolina, with fruit large, yellow streaked with carmine, and in quality "good" to "very good."

Etowah, from the Etowah Iron-Works in Georgia, is a medium-sized red fruit, and "good" in quality; season, winter; may be a seedling of Shockley.

Cooper's Yellows, another from the same source as Etowah, described as large, flat, yellow, with a faint-red cheek; October to January. Were we buying trees to plant in that region we should buy 1,000 of Shockley to one of these.

Zachary Pippin, originated at Belgrade, Maine; tree vigorous, forming a spreading top, not an early bearer; fruit large yellow, slashed, and striped with red; flesh subacid; November to December.

Smith's Favorite originated at Winthrop, Maine; tree vigorous, annual bearer; fruit medium, roundish oblong, yellow striped, and splashed with red; flesh pale yellow, moderately juicy, subacid, "good" to "very good;" October to November.

Haven, from Portsmouth, New Hampshire, may possibly be a new sort; owner knows only that some old trees on his place bear this fruit, and that he likes it. The fruit is of medium size, oblate conic, whitish, with a shade of red in sunlight, subacid; December to April.

Sarah—Origin, East Wilton, Maine; tree hardy, vigorous, spreading, an early and abundant bearer; fruit large, oblate conic, yellow, splashed, shaded, and striped with red; flesh whitish, "good" to "very good;" October, November.

Mathews, from Alton, Nelson County, Virginia, where it is esteemed for family use; tree stout, upright; fruit medium, roundish; flesh mild, subacid; "very good." October to February.

Transparent Zoar, from Zoar, Ohio; tree vigorous, early and an abundant bearer; fruit large, oblate, wax-white, shaded with delicate light

pink; flesh white, tender, juicy, mildly subacid, "very good;" September and October.

Stump.—A variety under this name is said to be grown in the town of Charlotte, N. Y., and is attracting much attention. It is little known, but the fruit has sold at $8 per barrel this past season. It is said to be of fair medium size, oblong in form, brilliantly colored, striped, and marbled red and yellow. The tree is said to be an abundant bearer. Nothing yet definitely known of it.

Reed's Golden Pippin, introduced by Pullen, of Highstown, N. J., who knows not of its origin, but says it is not surpassed in flavor by the Newtown Pippin, and is a *late keeper*; tree vigorous, with a large round head, a regular bearer, setting the fruit evenly over the tree; fruit medium size, roundish oblate; color golden yellow, flesh yellow, tender, juicy, subacid, slightly aromatic; core small.

Piedmont Pippin.—This is said to have originated on the farm of James Woods, Rockford, Va., and supposed a seedling of Yellow Newtown Pippin; tree short, upright; fruit large, roundish oblate, slightly angular, greenish yellow, tender, juicy, mild, richly subacid, slightly aromatic; season, late winter.

Smith's Seedling.—This is said to have originated with Hiram Smith, Woodville, Mississippi. Nothing has yet been said of the tree, but the fruit is large, oblate, slightly angular, pale greenish yellow; flesh whitish, tender, mildly subacid, rather rich and pleasant; ripens at the close of July. This, in our Northern and Middle States, would ripen in early September or October.

Pyle's Red Winter, from Glen Mills, Pennsylvania, may be a chance seedling or it may be some old sort; tree said to be vigorous, bearing early and abundantly; fruit large, roundish oblate, yellow, shaded with red; flesh whitish, crisp, tender, juicy, subacid. This may be the same as Pyle, described in Gardner's Monthly, 1871.

Mellinger, brought out to view by Dr. Mellinger, of Manor Township, Pennsylvania. Fruit medium to large, roundish conical, white ground, broken with splashes of raised red; flesh white, juicy, subacid; season, October and November.

Picket, from Arlington, Ky., where it is said to be esteemed as valuable, and keeping as late as the Winesap. Tree described as an upright, strong grower, bearing early; fruit large, roundish oblate, flattened, pale yellow, nearly overspread with a purplish red; flesh whitish yellow, pleasant subacid.

Magog Red Streak.—This is an old sort, from Newport, Vermont, the name of which is unknown, so one is attached; those who grow it say it is hardy, bears a small to medium sized fruit, yellow shaded with red; "good" from December to April.

Gog and Magog may be classed with this, and many others that are brought out yearly, and noted in fruit committee reports, to encumber our pomology, and cause study where there is no end of value gained. Please let us ask for some action of horticultural societies and publishers of journals, to the end that no *new* named fruit shall appear in their records or upon their pages until the same shall have been tested five years in ten different States.

CRAB APPLES.

The North, Northwest, and even the South seem to seek to grow crab apples, when with a little more skill and care they could grow the Jonathan, Red Canada, English or Poughkeepsie Russet. The common

Siberian crabs, as Red and Yellow, Cherry, Transcendent, Fragrant, Astrachan, Rouen, Showy, Striped, etc., are in almost every catalogue and familiar to the reading people. The Cherry, however, is not so well appreciated as it should be. Fruit of it, hanging on the trees, we have eaten in February as spicy and crisp as desired.

The Coral.—Fruit small, conical, flattened at the ends, warm yellow ground, with vermillion cheek; stem long, slender; cavity narrow and acute, slightly russeted; flesh yellowish, crisp, sprightly, juicy, rich, mild, subacid, excellent even as a table-fruit; December to February.

Hyslop.—This is an old variety long cultivated, but to-day in the new grounds of the Northwest it is of value. The fruit is roundish oblique; color a rich dark, almost black red on the side exposed to the sun, faint shade of yellow on the shady side; stem long and slender, like nearly all the crabs; cavity narrow and deep; flesh yellowish; very rich for cider.

Marengo.—This is perhaps one of the best in the whole lot. It is said to have fruited in Marengo, Illinois, (from whence its name,) over fourteen years without a failure. Its fruit is large for its class, roundish, flattened, at the blossom end yellow ground shaded with warm red, a few scattered light russet dots; stem long and slender, as usual with crabs; flesh yellowish white, crisp, juicy, a little harsh until fully ripe, then it is a mild, pleasant subacid; season from early winter until late spring.

Soulard.—This is the Soulard Crab, an old variety of no value which should be avoided by growers. This is also claimed in the South as an apple, but it is unfit for anything but cider, and poor for that.

General Grant.—This is one of the fall varieties. It is large for a crab, roundly oblate in form, yellow striped with red and often nearly covered with dark red, few light dots; stem, as usual with crabs; flesh white, fine-grained, mildly subacid; late autumn.

Meader's Winter.—This fruit is of medium size, roundish oblate, light yellow shaded with red, gray dots; flesh yellowish, crisp, tender, rich, sharp, subacid. Very valuable for cooking or cider; season, all winter.

Hutchinson's Winter Sweet is one of value where sweet is wanted. It is in condition October to January.

Orange is another good one, and *Montreal Beauty* and *Lady Crab* are two of the handsomest. The first, large of its class in fruit; the second, small; both in use October to December. *Maiden's Blush*, *Golden*, *Akin's Winter* all have character where grown. The latter of the three last named is perhaps largest and best of all for cooking or cider.

PEARS.

Bartlett, *Belle Lucrative*, *Beurré d'Anjou.*—These yet remain classed as among the best sorts either for garden or orchard.

Beurre Easter.—This variety does not meet with extended favor in the middle and northern sections, on account of the difficulty of ripening the fruit. In the south and southwestern sections, and in California, it is highly esteemed.

Beurre Diel, *Bloodgood*, *Buffum*, hold the same position to-day that they held fifteen years ago.

Dearborn Seedling.—Valuable only for the amateur.

Doyenné White.—This old variety yet holds a place with lovers of fine fruit for their own table, but the tendency that it has in some sections to produce imperfect fruit renders it impolitic to advise its general cul-

ture. In fresh rich western soils, California, and many of the Southern States, it does well.

Duchesse d'Angoulême, Flemish Beauty, Gloux Morceau, Louise Bonne de Jersey, Lawrence, Rostiezer, Onondaga, Seckel, Tyson, Urbaniste, Vicar of Winkfield, Winter Nelis, all retain their character, and *Flemish Beauty* is said to be the best of all varieties for canning.

Merriam, Lycurgus, Sheldon, and Clapp's Favorite are generally esteemed by those who have grown them. The Sheldon and Clapp's Favorite have perhaps a liability to decay at the core, and should be gathered as soon as the fruit can be separated from the tree without breaking the stem.

Belle Williams.—This variety has not yet shown qualities entitling it to supersede other winter varieties.

Beurre Giffard, Beurre Superfin, Beurre Bosc, Doyenné d'Été, Conseiller de La Cour, Duchesse d'Orleans, Madelaine, McLaughlin, Nouveau Poiteau, Stevens' Genesee, Wheildon.—All these retain the good character ascribed to them in 1863, but the Conseiller de la Cour, McLaughlin, Nouveau Poiteau, and Wheildon have not been largely planted.

Doyenné Gray, Washington, Jalousie de Fontenay Vendee.—These three varieties continue to hold position as of best quality and of value for home use.

Doctor Reeder.—This valuable pear originated with Dr. Henry Reeder, Varick, Seneca County, New York, from seed of a Winter Nelis which stood in the immediate vicinity of a Seckel. It was first called by Charles Downing Dr. Reeder's seedling; afterward the word seedling was dropped as an absurdity, for certainly every new variety of fruit must be a seedling. The fruit resembles Seckel in form, except it is a little more globular than either of its parents. In size, it is small, like its parents, globular, obtuse pyriform, pale yellow ground, mostly overspread with a smooth warm cinnamon russet; stem slender, three-quarter inch long; cavity open, broad, with a lip on one side enlarged; calyx large, open, with erect, divided, rounded segments; basin shallow, broad, and open; flesh yellowish white, fine-grained, juicy, melting, almost buttery, sprightly sweet and slightly aromatic; quality "best;" core medium; season, early November.

Huyshe's Victoria.—This pear comes to us from Clythedon, England, where it originated from seed of the Marie Louise, crossed with Gansel's Bergamot, sown by Rev. John Huyshe. We believe it was first fruited in this country in the grounds of Messrs. Ellwanger and Barry, of Rochester, who are always on the lookout for any new or valuable plant, tree, shrub, or bulb. Fruit—size medium; form globular, slightly pyriform; surface a little rough; color greenish-yellow ground, mostly covered with a dull russet; stem half to three-quarters of an inch long, largest at connection with the tree; cavity with a lip or raised side; calyx open, with short reflexed segments; basin broad, regular, rather deep; core small; flesh whitish, fine-grained, melting, pleasantly sweet, and vinously aromatic; December.

Beurre Hardy.—This variety is an old pear among our eastern cultivators, and although not of the highest excellence in quality, it is healthy, hardy, vigorous, and productive. It comes early into bearing either on the pear or quince stock; the fruit is uniform size, and it has ranked as "very good, to best" in pomological parlance or rules. Fruit—size above medium; form oblong, obovate, obtuse, pyriform; color rich, warm, smooth, brown russet; stem medium, set at an angular inclination, with an open cavity indicating a faint lip at the base; calyx open, with small

obtuse-pointed segments; basin deep, broad, and open; flesh white, vinous, melting, juicy, rich, and sweet; season, October.

Emile de Heyst.—This is claimed as a Belgian fruit. It is moderately vigorous, healthy, yet a straggling and spreading, rather than an upright grower, setting its fruit almost too closely; it should therefore be in the hands of a careful cultivator or amateur, who does his own work rather than take credit for work done by his laborer. The Emile de Heyst, as a tree, has one high character in favor of its hardiness, viz, it holds its foliage late in the autumn, and so helps in the ripening of its wood and buds. The fruit is above medium to large in size; form oblong, obovate, pyriform, somewhat angular, and occasionally irregular; color a light, clear yellow, washed and waved with fawn and russet; slightly orange cheek, and, when well ripened, almost a ruddy russet yellow; stem medium, curved, slightly inclined; cavity slight, with a gentle lip or base ridge; calyx small, nearly closed, with short, pointed, half reflexed segments; basin, slight, delicately furrowed; flesh buttery, melting, fine-grained, juicy, sugary, and aromatically perfumed. Few who eat of it when in condition but class it as "best." The season of its maturity depends upon the climate in which it is grown. In the North would be some forty to sixty days later than in the South or center.

Foote's Seckel.—This pear was grown from a seed of the Seckel by Asahel Foote, of Williamstown, Mass. The tree is more vigorous and spreading in its growth than its parent, and equally hardy and productive. Fruit somewhat larger and broader than its parent, especially at the blossom-end; color russety yellow, shaded slightly with crimson in the sun, or some would call it bronzed russet; stem varying in length and size, we suppose according to the exposure of the bud and fruit to the sun; cavity small; calyx open, with short reflexed segments; basin broad, shallow; flesh much like Seckel, a little more vinous, yet with much of the sweetness and aroma that is part and parcel of the Seckel. Ripened where it originated, its best condition is in September. In the south and southwestern States, it would probably ripen in August, and in Canada, Iowa, or Minnesota, October would perhaps be its season.

Pitmaston Duchesse d'Angoulême.—This variety was grown at Pitmaston, England, and first fruited in this country 1870, by John Saul, fruit and seed grower and dealer, in Washington, D. C. The name is unfortunately too long. If our American Pomological Society would class it as "Pitmaston Duchesse," and so let it go before the public, there would be one error in nomenclature in a sense corrected. It is said the seed of its growth came from a cross fertilization between the Duchesse d'Angoulême and the Gloux Morceau, but the fruit from which we make our drawing and description is all unlike either parent. At this writing, 1876, we know not of the planting of the trees to any extent, or their positive value to this country. Illustration and description as follows: Fruit—size large; surface undulating; form oblong, obovate, acute pyriform; color pale yellow, mottled, dotted, and marbled with thin cinnamon-colored russet, this being heavier and deeper in color at both the ends, stem, and calyx of the fruit; stem quite stout, curved, set in a slight oblique cavity; calyx large, open, with erect half reflexed separated segments; basin slightly furrowed, broad, open, and quite deep; flesh whitish-yellow, moderately fine-grained, a few granules next the core, buttery, rich, juicy, sprightly sweet, almost if not quite "best" as to pomological rules; core rather large, seeds imperfect, showing its hybrid parentage. From what is known of this variety, it should be tested all over the country.

Sam Brown.—This is another pear first brought to the pomologist's

knowledge by John Saul, of Washington, D. C. On the old estate of Sam Brown, of Walnut Hills, Anne Arundel County, Maryland, this is a chance seedling, that is, a tree of vigor and healthfulness, and for many years has been a full and regular bearer. The fruit before the describer in size is medium or above; form roundish and slightly conical, sometimes ovate; color a rich, warm, dull yellow, with some russet and some russet specks, in appearance much like the old Brown Buerre; stem short, largest where it connects with the tree or bearing branch; cavity narrow, deep, yet open and smooth; calyx medium size, segments half reflexed; basin broad, open, and deep; flesh fine-grained except next the core, melting, juicy, vinous, sweetly aromatic, almost "best;" season September in its original home, earlier probably South and later North.

Souvenir d'Esperen.—This we suppose to be a Belgian fruit. It has been fruited many years by amateurs and those engaged in the study of fruits and their value when brought before the public for planting out as small or extended orchards. To-day it ranks as a tree healthy, hardy, and productive, holding its foliage late in the season, and being of value to the amateur or market grower. The fruit is of size medium to large; form pyramidal, perhaps a little oblique; stem long, slender, and curved, little or no cavity; calyx small, open, with medium-sized, upright segments; basin small, round, slightly uneven or furrowed; color tending to a dull yellow, mainly covered with a thin cinnamon russet; flesh yellowish-white, vinous, juicy, aromatic; season, October to November at the North and Northwest, but from one to three months earlier at the South.

Triomphe de Jodoigne.—This is of Belgian origin, introduced to this country in 1843. It is yet but little known. It is large in size under good culture and in good soils. The tree, when well cultivated, is hardy, vigorous, and productive. Once tested, it may prove a good market sort, but the writer thinks our people will educate their tastes to the abandonment of show for that which is intrinsically good. Fruit—large to very large, obovate, obtuse, pyriform, greenish-yellow, shaded and mottled with red nettings and traces of russet; stem fleshy at its insertion; calyx open, with stiff, erect segments; flesh white, middling juicy, coarse, half melting, sweet, good; October.

Weltz.—This is a seedling introduced by Leo Weltz, Wilmington, Ohio; is valuable over the old Pound or Uvedales St. Germain as a cooking pear. We figured it, and gave it, as we think others have, the go-by, not equal to Pound, and certainly not equal to Belle Williams, not to mention Vicar of Winkfield.

VARIETIES RECENTLY INTRODUCED.

The pear is the king of fruits. He who writes of it for the public must be very careful of what he names as worthy their patronage, and to caution buyers against paying an extravagant price for any untested plant or tree.

Springfield or *Primrose* is the name of a new native seedling, given by John Saul, Washington, District of Columbia. He thinks it superior in quality and flavor, also in size, ripening from 20th July to last of August in his section. It probably deserves attention.

Nabours.—Synonyms: Nabors, Neighbors, Green Cluster. This is said by some to have originated in Alabama, by others in Middle Georgia. The South must decide the point. It is described as large, acute, pyriform, dark green, much covered with russet; stem long;

calyx open; flesh coarse, melting, juicy, sweet; season, mid-August; tree a compact, upright grower, productive, and holding its foliage until winter.

Stockett.—This pear is named by John Saul, of Washington, D. C., as a new variety; large, obovate, pyriform, yellow, with a bright, red cheek, promising to be valuable for market purposes; season, about mid-August.

Souvenir du Congrés.—This foreign pear is large and handsome, ripening before the Bartlett or with Clapp's Favorite. The tree is a fine grower, but while it promises well, it is not advisable yet to plant of it largely. Rivers, of England, claims that it originated from seed of Bartlett, but the Revue Horticole gives it as raised by M. Morel, of Lyon-Vaise. It is a large and fine-looking fruit, but I have heard statements of its inferior quality after the tree has come into full bearing. It has been about eight years before the publc.

Beurré del Assomption is another of the promising foreign sorts, ripening very early; of large size; shape pyriform.

The Eugene Appert.—Medium size, ripening at the South or middle section in October.

Henri Desportes.—A summer variety of good size and quality.

Maurice Desportes.—Of size medium to large, and of good quality, ripening early in September.

Dr. Nelis is another new foreign sort, of small size, but superior in quality, making it a first-rate dessert pear; ripens in September.

St. Therese.—Fruit medium to large; flesh, melting, sweet, first-rate; October and November.

Petite Marguerite.—A small fruit, ripening in mid-summer, and of excellent quality.

Madame Freyve.—A fine pear so far as yet known, from once or twice fruiting, on a graft of a bearing-tree. In flesh, it is melting rich, sweet, aromatic; September.

Bonne du Puits-Ansault is of medium size, roundish, slightly pyriform with flesh rich, juicy, melting, sweet, deliciously aromatic; season of maturity in the middle or northern central line, about September and October.

Duchesse Précoce is an early variety resembling the old Duchesse D'Angoulême; large and handsome; may prove profitable for market.

Therese Appert.—This, perhaps, is one of the new varieties deservedly claiming attention and trial. It was fruited first by Ellwanger and Barry, of Rochester, in 1871. The fruit is medium or above in size; form obovate pyriform; color dull yellowish with numerous small, dark, half-russety specks; stem stout, largest at the end connecting with the tree; little or no cavity or depression; calyx half open, with short, half-recurved segments; basin shallow; flesh yellowish white, slightly granular, melting, buttery, with a rich aromatic flavor; October.

CHERRIES.

Early Purple Guigne, *Elton*, *Early Richmond*, *Belle de Choisy*, *Black Tartarian*, *Reine Hortense*, *Red Jacket*, and *Rockport* all retain the first-class positions ascribed to them in 1864.

The sweet varieties of cherries do not need a very rich soil, neither do they want their lower roots to lie in a dirty-water bed. The cultivation to make healthy trees, is to give one year, that of the planting, of careful work in the keeping the surface of the ground six feet in diameter mulched with leaves or light new-mown grass two inches deep, and daily raked over with a four-inch tooth iron-rake. The second

and third year, keep on the mulch, widening it two feet, but making it no thicker; afterward let the tree alone. Do no pruning, unless a dead limb or twig shows; cut that carefully away close to the main branch. Have the tree first form its lower branches within two feet of the surface of the earth. When planting never cover the upper roots over four inches with soil.

Belle d'Orleans.—This is a foreign variety of above medium size, of a round, heart-shaped form, whitish yellow, covered mostly with pale red; flesh tender, juicy, sweet, excellent; season, early June at the North, May at the South. It is a good cherry, but not equal to Rockport.

Black Hawk.—This cherry is one of the best originated by Prof. J. P. Kirtland, Cleveland, Ohio. Tree healthy, vigorous, spreading in habit. As a table-fruit, among the black cherries it has no superior, and for market it is one of the best. The fruit is large, heart-shape, often obtuse; sides compressed; surface uneven; color dark purplish black, glossy; flesh dark purple, half tender, almost firm, juicy, rich, sweet, fine flavor; season, according to the location, from early May to 1st of July.

Lady of the Lake.—This is an American variety, originated by Charles Pease, of Cleveland, Ohio. The tree is vigorous, upright, spreading, and productive. Fruit medium to large, roundish, obtuse conic, compressed, shallow suture; knob and line on opposite side; color light yellow, shaded and marbled with rich bright crimson; stem medium, cavity deep; flesh half tender, pale yellow, juicy, sweet, and rich, delicious for the amateur or home family, of no value for market; season, according to climate, from early May to last of June.

Ohio Beauty.—This variety is one of the many that originated under the care and culture of Prof. J. P. Kirtland, of Ohio. His success in the production of cherries has given him a leading name not only in America, but also in England and Germany. The Ohio Beauty did not show itself fully for several years after it was brought out; but when the trees once came into full bearing, favorable reports came to the professor from all quarters where it was grown. Fruit large, form round, obtuse heart-shape; suture slight, color light yellow grained, mostly overspread and marbled with dark, rich, and pale red; stem rather long and slender, set in a deep, open basin; flesh yellowish white, tender, juicy, delicately sweet, with a rich, fine, sprightly flavor; season, according to climate, from early May to last of June; tree healthy, vigorous, forming a round, open head that comes early into bearing abundantly.

With the last named we now have the class of strictly sweet cherries. The Dukes and Morellos are more hardy and bear better the neglect which most farmers and fruit-growers give to their orchards. The old Kentish Cherry, as well as the old Flemish, is widely grown in the Southwestern and Western States as Early May. There is also a Late Kentish, which, in the New England States, is known as the common Red or Pie Cherry. All these are so intermingled that no man living can convince the West that they have no distinct Early May Cherry; for, if they could do so, they would, we think, trace it up and give us its history.

The Old Kentish has the base of the blossom-buds always attached to the stalk; so also has the Early Richmond; but the growth of the trees is distinct. The Flemish also has the habit of producing in couples, but the fruit is flattened at each end, and capsules covering the blossom-buds drop with the petals. The Early May or Précoce, with nine other synonyms, is a dwarf tree, bearing abundantly a small, round, slightly flattened, lively red, tender, juicy, acid fruit. I have had specimens of

this cherry from Kentucky under a new name and purporting to be an original seedling.

Donna Maria is a Morello, forming a small, very regular, round-headed tree, and producing abundantly a fruit of medium size, roundish, dark red, tender, juicy, richly acid. This variety the writer has gathered in early July, and kept two weeks, packed layer by layer on paper. Climate, as with all others, governs the period of ripening.

Louis Philippe.—This variety comes from France. The writer first obtained it from M. Andre Leroy. In growth and habit it is mid-way between a Duke and Morello; tree upright, spreading, forming a handsome roundish head of full medium size; foliage more resembling the Duke than the Morello. It is very productive, and for market or canning purposes those who have grown it say it has no superior; fruit large, roundish, regular; stem rather short, stout, set in a broad, even, regular cavity; usually grows in clusters of three; color almost purplish black red; flesh red, tender, juicy, sprightly, mildly acid; stone or pit small; season, on south shore of Lake Erie, Cleveland, from the middle to the last of July.

Imperatrice Eugenie.—Synonym, Empress Eugenie, a variety of the Duke family, from France. It has short, stout shoots, rather dwarf, and round-headed in form; very productive; fruit large, roundish, flattened; color dark rich red; suture broad and shallow; stem rather short, planted in a deep cavity; flesh reddish, tender, juicy, rich, sub-acid; pit or stone small; season in the northern Middle States, middle of June.

Large Montmorency.—This is not specially a new fruit, yet it is little known. The only bearing tree we know of is in Ellwanger & Barry's ground at Rochester, N. Y. The tree is very hardy and vigorous in growth for a Morello; also it is productive. Fruit large; glossy, red color; mild, sprightly, richly acid. Matures a week or ten days later than the Early Richmond. This may be criticised as being no more nor less than the old Flemish or *Montmorency à Gros Fruit*, but the growth of the tree shows it to be distinct.

Nouvelle Royale.—This variety is of the Duke class, grown on Mahaleb stock. It has a handsome, round-headed tree; fruit large, roundish, glossy red, with dark red dots; flesh tender, melting, juicy, sweetly acid; July.

GRAPES.

The Concord, Catawba, Delaware, and Norton's Virginia are about all that meet the public demand. The Concord proves reliable in almost all locations and soils, Catawba and Delaware must have special locations and soils, while Norton's Virginia is only planted for wine use. Large numbers of seedlings have been produced in the time intervening.

A tide of favor toward the culture of the grape, with some extravagant statements of the value per acre, swept over the whole country with a wave that almost drowned every other item of fruit-culture, and induced hundreds to engage in the growing of new varieties from seeds of the natives or from seeds cross fertilized with the native and foreign sorts. Millions of money have been, in the past ten years, invested in land, culture, and vines, largely at a loss. In this review we propose to touch lightly and with few words upon the leading varieties that have been before the public.

Alvey.—Origin, Hagerstown, Maryland, has had a long record; when it can be grown, it is a fine fruit, of medium size, of no value except to the amateur.

Autuchon originated with Charles Arnold, of Paris, Canada West, who deserves credit for his effort for production of new varieties.

Canada, another small, black grape, ripening with Concord.

Cornucopia makes a fine, shouldered bunch; erroneously described as having a large berry. See illustration in Moore's Rural New Yorker of June 11, 1870.

Othello is another of Arnold's, a fine-looking bunch, berries half size of Concord, black, and with the Clinton harshness of flavor.

J. C. Neff, Duncan's Falls, Ohio, brought before the public a grape under name of *Black Hamburg of the Rhine*. The growth was wild enough, and the berry small and black; would never be eaten by humanity, and could not be made into a Rhine wine.

The *Miles* grape is small, but one of the earliest to ripen, about August 1, and holds good upon the vine until September. It is black, a little thick of skin; but if you have children in your garden or vineyard, they will find the Miles, and ere you know it the crop is gone. This variety seems to do well in all soils, but is of no value as a market sort.

Logan.—Another early-maturing black grape; poor bunches, with a hard center of berry; valueless.

Winslow may be valuable for making a red wine. The berries resemble Clinton, color early, and hold to the vine; late.

Israella.—This was brought out by Dr. Grant, the grand purveyor of Iona. Both it and the Iona have had their run.

Belvidere.—This grape was brought before the public in January of 1870, by L. L. Lake, M. D., of Illinois. It was stated to ripen before the Hartford Prolific, and to be superior in quality. Who knows of it now?

Barry.—One of E. S. Rogers's, (Salem, Massachusetts,) productions, sent out first as No. 43. It is a large, showy, black grape.

The *Croton* grape, together with the *Senasqua*, originated with Stephen Underhill, of Croton Point, New York. From this point, many years, the Underhills sent the Isabella to New York in such perfection that it received ready sale. As the intelligence of the age and the delicacy of taste grew, there seemed a something wanting in the grape line, and while the grape-wave was sweeping over this country, Stephen Underhill produced the two above-named grapes, in quality almost rivaling the best foreign varieties. There is with both these varieties a tendency to overbear while young, and they have thus at times disappeared, to the great regret of owners. The Croton much resembles the Clinton in its growth, has a roundish heart-shaped leaf, rather thick, green above, whitish underneath; wood of medium size, firm and hardy; fruit-bunch large, half compact, double shouldered, long with peduncles, firm, stiff, and moderately long; berries medium, roundish, oval, pale yellowish green, translucent; flesh pale yellow, juicy, sweet, slightly vinous, and rich; season, at Croton Point, September.

The *Senasqua* has a vigorous vine; leaf large, thick, downy underneath, deep green above; bunch large, with a slight shoulder or off-shoot bunch; berries irregular in size, from medium to large, black, with a light-blue bloom; when fully ripe the separation of the peduncle from the berry leaves a tinge of red at the base; flesh dark purple, juicy, rich, half firm, slightly vinous, sweet, free from pulp; season, at Croton Point, last of September.

The *Black Hawk*, *Brinckle*, *Challenge*, *Clara*, *Clover Street Black*, *Clo-*

ver Street Red, *Conqueror*, *Eumelan*, *Hine*, *Lydia*, *Lady*, *Martha*, *Telegraph*, *Walter*, and many others, are described, propagated, and fruited.

The *Martha* is a large, greenish-white grape, much like Concord in quality. *Lady* is another large, greenish-white variety, new, and untested. *Telegraph* is an old, reliable black grape, that took its name from being distributed gratis by the editor of the Germantown Telegraph, Pennsylvania. It should be in possession of every man. The vine is hardy, bears abundantly, and ripens early; a large, black, good grape.

Mr. James H. Ricketts, of Newburgh, N. Y., has recently produced over one hundred new varieties. Messrs. Charles Downing, Patrick Barry, and John J. Thomas, appointed a special committee to examine alleged new varieties grown by him, make a report, from which the following is an extract:

"Without attempting, on the present occasion, to give descriptions of the many varieties which he has produced by cross-fertilization, we may state, in a general way, that so great has been his success that his collection of nearly a hundred new grapes, in bearing, can scarcely fail to excite little less than astonishment at the results. These experiments were performed on less than an acre of land, the soil of which is a medium loam, with some manure, and all thoroughly cultivated. Hills offer shelter from the west winds. The vines are all laid down, but not covered, in winter, the object being to preserve their full vigor for early spring growth. The winters at this place have been so severe as to destroy the vines of the Clinton when fully exposed.

"A part of the crosses are wholly of native parentage, and these, although excellent in many instances, were in no case so large in bunch nor so showy as the hybrids of natives with exotics. The object has been to place the fine bunches and fruit of the delicious foreign sorts on the hardy and vigorous native vines, by fertilizing the latter with the former. In several instances, at least, this result appears to have been accomplished in a satisfactory manner.

"Among the crosses with natives wholly, were those produced by crossing the Clinton with the Iona, the Delaware with the Iona, the Concord with the Iona, and the Clinton with the Delaware. Some of these crosses were fruits of much excellence. The crosses of natives with foreign sorts were, Clinton with Muscat, of Alexandria; Isabella with White Tokay, Iona with Silver Frontignan, and Hartford with Muscat Hamburgh.

"Among the native crosses, the largest bunches seen were six inches long; most of them were four or five inches long. Of the native and foreign hybrids, some were eight inches long, with showy and excellent berries. Some of these, for healthy and vigorous growth, and strong, thick, adherent leaves, were fully equal to Hartford Prolific. Although cultivators have felt much fear that all hybrids of this climate may ultimately fail, or become mildewed, our hope in the ultimate success of some of these was greatly strengthened by seeing large, heavily-shouldered bunches, with large, white, rose-colored, or dark, grapes, possessing nearly the delicacy and excellence of exotics, growing on vines apparently as healthy as the Concord. And we are by no means prepared to reject the position laid down by Mr. Ricketts, that he can place the delicate, exotic bunch on the strong and hardy native vine, both retaining permanently their character, although years may be required to establish or disprove it."

At the grape show, held in New York City, September, 1870, the first prize for the *best new black grape* was awarded to Mr. Ricketts. It was

then unnamed, but I think it is the grape now called *Advance.* The bunch is large, generally shouldered, berry large, oval, black, with a thick, blue bloom; flesh soft, tender, melting, juicy, sweet, vinous, pleasant, slight spice aroma; foliage large, deeply lobed, and serrated. At the same time, Mr. Ricketts had on show one that he had then named as *Secretary.* Of this, the size of bunch is large, the berry medium, or above in size, black, with a slight bloom; flesh delicate, rich, slightly subacid sweet, with a fine aromatic flavor.

Don Juan.—Bunch large, shouldered, sometimes double shouldered; berry large to very large, oval, dark red, with a light-blue bloom; flesh rather firm, juicy, slightly vinous; foliage medium, thick, deeply lobed, slightly serrated.

Imperial.—Bunch medium, shouldered; berry large, oval, greenish-yellow, with a thin, whitish bloom overshading; flesh tender, soft, juicy, sweet, slightly vinous, with a delicate muscat flavor or aroma; leaf large, lobed, and coarsely serrated.

Quassaick.—Bunch large, shouldered, sometimes double shouldered; berry medium to large, round, inclining to oval, deep black, with a thick light-blue bloom; flesh meaty, crisp, tender, juicy, sweet, very slightly vinous, rich, aromatic; skin thin, but tough; foliage large, thick, roundish, deeply serrated.

Waverly.—Bunch medium, sometimes shouldered; berry medium, round, deep black, with a heavy blue bloom; flesh meaty, crisp, juicy, slightly vinous, refreshing, sweet; foliage rather large, thick, deeply serrated, inclined to be lobed.

The South, our friends there say, must look mainly to their native varieties, especially the *Vitis rotundifolia*, or *vulpina*, ranging from North Carolina to Texas. The growing of the grape at the South is entirely different from that industry at the North. It is advised to plant 20 to 30 feet in a row, train on arbor or trellis, and never trim.

Mr. P. J. Berckmans names the *Richmond* as the earliest, maturing in July and August; *Scuppernong* immediately following it; then *Thomas;* then the *Flowers*, *Pedee*, and *Tenderpulp.*

PEACHES.

Crawford's Early, *Hale's Early*, *Late Admirable*, *President*, and *Oldmixon Freestone* are in quality as good as ever, with the exception of *Hale's*, which, in some soils and locations, rots badly before ripening. These are yet propagated and planted.

A thoughtful and careful writer says that in peach-growing, there is a standard to be maintained touching both the season of ripening and that of the fruit offered for sale. The distinctive names of peaches have become terribly mixed. The old Abricotee was for a time known as Orange, and also as Yellow Admirable; Yellow St. John, Downing, is given as Flater's St. John; Berckmans gives it as Flater, or Yellow St. John; the Columbia, or old Indian peach, has scores of names, and yet from it have sprung some of our best yellow flushed peaches.

The introduction of my early, as well as my late ripening varieties, was favorably received by many growers. The Hale's Early was a chance seedling, probably from the Large Early York, and the tendency has been to grow from it. The Alexander and Amsden are two of our new native, early ripening varieties, said to ripen two weeks before Hale's Early. Thomas Rivers, of England, has paid special attention to bringing out very early ripening varieties: Early Beatrice, Early Louise, and Rivers' Early. These very early ripening varieties may

pay the grower in the Southern and Midland Southern States; but our impression is that the very late and longest-keeping varieties are for the North. The intermediate sorts and periods of ripening cannot be abandoned, and, as a rule, will pay best, if the grower is near a good market. At this period no definite opinion can be given of the new varieties.

Of the intermediate sorts, the old Columbia, with its varied synonyms, so easily propagated from seed, and so firm in carrying, should never be forgotten. From this a variety called *Amelia* was grown by George Husman, of Hermann, Missouri. It resembles Columbia, but is later in ripening. There is another Amelia, with five synonyms, first grown in South Carolina, by a Mr. Stroman. This is of a whitish color, shaded and marbled with crimson, varying in its period of ripening according to climate, from July to August. It is a valuable peach for the amateur. Of the class ripening at the mid-season, we name as of value, Bergen's Yellow, Foster, Mountain Rose, Richmond, Thurber, and Osceola. We might name many more equally good, but the grower, either for home use or market, should confine himself to a few varieties. There is, however, an old peach, which we do not like to have forgotten, the *Noblesse.* Synonyms: Lord Montague's Noblesse, Mellish's Favorite, Double Montague, Vanguard, Noblest. Tree a moderately slow grower, very healthy and hardy; at the North, in poor ground it is liable to mildew; but in good ground, at the North and at the South, it sustained a character that has rarely been rivaled; it originated on the other side of the water; flowers large; leaves serrated, without glands; fruit large, roundish, oblong, narrowed at apex, and terminated by a small point; sometimes this point is quite prominent; color pale greenish-white, marbled, and shaded with two shades of red, clouded; flesh pale greenish-white, melting, with a rich delicious flavor; freestone; season, last of August and early September.

Of late varieties, *Picquet's Late*, originating in Georgia, has a reputation as one of the large yellow peaches ripening in September, rich, sweet, and of high flavor.

Lady Parham, of southern origin; fruit medium size, greenish-white, not showy; suture distinct, deep; flesh white, pale red at the pit; season, October at the South.

La Grange originated in Burlington, New Jersey. Tree a healthy grower, holding its fruit well; leaves with reniform glands. Fruit large, roundish, oblong; color greenish-white, shades of red where exposed to the sun; flesh delicate white, melting, juicy, delicious, very rich, sweet, and high flavored; ripens at the North last of September and early October; freestone. For canning and late keeping this is valuable, and has but one competitor, viz, Ward's Late Free.

Druid Hill.—This was originated by Lloyd N. Rogers, of Baltimore, Maryland. The tree is very vigorous; shoots strong; leaves large, with globose glands; fruit large, roundish; suture slight, swollen, point distinct; color pale greenish-white, clouded with red where exposed to the sun; flesh greenish-white, purple at stone or pit, melting, juicy, exceedingly rich, and high flavored; stone or pit long, compressed, furrowed; season, last of September and early October, at the North.

Salway.—This is an English variety, and was first fruited in this country by H. H. Hunnewell, esq., of Massachusetts. The tree is vigorous; leaves large and broad, with reniform glands; fruit very large, roundish, oblate, with a broad, deep suture; skin downy; color creamy yellow, with a rich, clear red cheek; flesh deep yellow, one and one-quarter inch in thickness, stained with red at the stone, juicy, melting

rich, sweet, with an apricot flavor. As a late-ripening yellow peach for the North it is valuable; season, October.

Darby.—This is a South Carolina production, and probably valuable there. It is a clingstone, ripening at the South the last of October. Fruit large, round, creamy white, with a pale blue wash one side; flesh, white to the stone, juicy, sweet, very good.

The *Lemon Clingstone.*—This peach is named Pine-Apple Cling at the South. It is possible there may be a reason for this change, but ninety-seven people out of a hundred, who know a peach, will, on seeing this, name it Lemon Cling. It is an old sort, good to-day; originated in South Carolina; took its name as Lemon Clingstone, and has carried it many years with its seven synonyms. The tree is hardy and productive; fruit large, oblong, narrowed at the blossom end, with a knob like that of the swollen point of a lemon; color fine yellow, with a brownish red cheek; flesh firm, yellow, slightly red at stone, adhering firmly, and rich, vinous, and slightly subacid in flavor; ripens at the North and in the middle sections, where it is widely and profitably grown, from 15th to 25th of September.

Tippecanoe is another valuable variety of the late yellow-fleshed clingstones. It originated in Philadelphia, and to-day holds there a leading part as a clingstone of its season, last of September.

Ward's Late Free.—This is an American variety too much neglected. It is a freestone, with quality of the best of the rare-ripes. Fruit rather large, roundish, inclining to oval; color white, with a rich crimson cheek; flesh white, slightly tinged with red, at the stone, melting, juicy, rich, excellent; season October.

IMPROVED MINNESOTA FLOUR.

By Norman Buck, Winona, Minn.

The methods of manufacturing flour in Minnesota have been greatly improved within the last sixteen years. More attention is now given to cleaning the grain than formerly, though the improvement in this is not so marked as in the methods of grinding. The machinery used in cleaning is not uniform, but varies according to the skill of the miller and the capacity of the mill. The method most common, in the best mills of the State, is to pass the grain, as it is received from the farmer, first, through an hexagonal sieve; secondly, through a combined separator and smutter; thirdly, through a scourer. The machine designated as a scourer is simply an improved method of cleaning the grain, and does not in any sense scour the grain by removing the outer layer of the bran as is sometimes done in Europe. The European method of scouring is not practiced in the State. This machinery is sometimes greatly multiplied and varied in its combinations, but the above comprises the method in common use.

The process of crushing wheat by passing it between marble rollers after it passes through the scourer before grinding is in use in some mills, and is claimed to be peculiar to Minnesota. This has two advantages: first, it makes a much larger quantity of middlings, which is the main object sought in high grinding; second, it flattens the chit of the grain so that it is more easily separated from the flour.

The introduction of a process of separating the middlings from the bran and cleaning and regrinding them marks an epoch in flour-making in the State.

A few years since a Frenchman by the name of C. N. La Croix immigrated from France and located at Minneapolis. He was a miller by trade, and introduced into a mill in that city, owned by Mr. Christian, the system of high grinding in use in his native country. This process though new to Minnesota, and probably to the United States, had long been known in some parts of Europe, as the Hungarian system of high grinding. It is claimed on good authority that it was known to the ancient Romans, also to the Athenians and Egyptains, many centuries ago. Professor Beckman said, in 1846:

For some years past the French have so much extolled a manner of high grinding, called *mouture economique,* that one might almost consider it as a new invention. This art, which, however, is not new, consists in not grinding the flour so fine at once as one might wish, and in putting the meal afterward several times through the mill and sifting it through various sieves. This method, which really has nothing in it either ingenious or uncommon, was known to the ancient Romans, as we may conclude from the account of Pliny, (who died A. D. 79,) which names the different kinds of meal such as similage, simila, flos, pollen, cebarium, &c. These words are not synonymous, but express clearly all the various kinds of meal or flour which were produced from the same corn by repeated grinding or sifting. In general, the Romans had advanced very far in this art, and they knew how to prepare from corn more kinds of meal, and from meal more kinds of bread, than the French have hitherto been able to obtain.

In 1870, one Jacob Levy patented in England parchment sieves for separating "*midlins*" and semolina. Flour produced by this method of grinding was exhibited at the World's Exhibition in London, 1851, and attracted especial attention. Soon after this exhibition the principle of using currents of air for the separation of middlings and semolina, "whereby the branny particles were held in suspension and deposited into various chambers of the separating apparatus according to their respective gravities," came into use.

In 1860, M. Perrigault, in France, introduced some important improvements for the purpose of separating semolina and middlings. His improvements consisted in drawing currents of air through the meshes of a silk sieve; thus dispensing with one workman in keeping the sieve clean, and combining the sifting motion of the sieves with the air-currents; thus more effectively and with less labor separating the middlings and preparing them for grinding. This machine was, probably, known to La Croix at the time he immigrated to the United States, and he probably introduced the principles combined in it, if not the identical machine, into the mills at Minneapolis. This machine consists of a silk sieve, with meshes of the requisite size, hung with a slight decline upon pendants, with a longitudinal vibration. The flour passes from the hopper into the sieve, being evenly distributed through feed-rollers, and passed the length of the sieve. A current of air, entering under the feed-rollers, passes upward through the sieve, thus keeping the middlings suspended, and separating the lighter from the heavier portions.

In 1870, Mr. George T. Smith, of Minneapolis, obtained from the United States a patent on a process for cleaning the middlings preparatory to regrinding. To his first patent he has added several others. The machinery for this process is very similar to that patented in France in 1860 by M. Perrigault, with the addition of a brush and series of brushes of a length corresponding with the width of the silk sieve over which the middlings pass. This brush is held in position with two chain-belts, to which it is attached, and passes beneath the silk sieve the entire length, brushing the screen underneath, thus aiding to keep it clear of obstructions. The principles used in the La Croix machine, in various combinations, and the Smith improvements, constitute the most approved process in common use in Minnesota, and the one by which the Minnesota patent flour is manufactured.

There are a few mill-owners who claim methods still better than those above described; but whatever improvements they may have made, whether by greater mechanical skill in the use of the Smith patent, or by improved machinery, or by new combinations of old machinery, is not known outside of those operating them. From motives of profit, they choose to keep their process a secret.

The marked improvement in the quality of Minnesota flour is due not merely to improved machinery and new processes, but also to the character of the wheat raised in the State. High grinding requires hard wheat. The success of this method consists in grinding wheat in such a manner that the inner portion of the kernel is broken into small particles or substances without pulverizing. To accomplish this, hard, brittle wheat is required. Soft wheat is therefore of less value than hard, and the old method of distinguishing wheat, such as chit-wheat, fife-wheat, &c., is now being displaced by the designation of hard and soft wheat. Fife-wheat, being very hard and brittle, is held in the highest esteem by Minnesota millers.

The peculiar properties of flour made from middlings reground are strength and whiteness. The proportions of different kinds of flour produced by the system of high grinding are about 75 per cent. flour-dust and 25 per cent. middlings-flour. When the flour-dust and middlings-flour are run together, the mixture is designated as straight flour, and by many most esteemed for family use. Middlings-flour put up by itself, and not mixed with the flour-dust, is known as patent flour. This is the strongest and whitest, and is esteemed by many for family use, but most highly prized for pastry and fancy cooking. The flour-dust is the lowest grade of Minnesota flour.

POTATO-FLOUR OR FARINA.

By A. S. Macrae, Toronto, Canada.

It is a singular fact that the manufacture and exportation of potato-flour has scarcely yet attracted attention in the United States, although a trade to the extent of perhaps millions sterling per annum is being carried on in the various States of Europe, Scotland, Ireland, Holland, Germany, Belgium, France, &c. Farina-mills everywhere abound, the smallest of which is able to turn out about 2,000 tons yearly, of a value of $200,000.

Twenty years ago Scotland manufactured the principal portion required by the British demand; but now the Dutch have driven the Scotch out of their own field, owing to the increased average value of potatoes in Scotland as compared with Holland, and the abundant water facilities which the latter country possesses in its internal canals. The first cost of potatoes, however, is the permanent foundation of success, and whatever country can produce them the most economically must ever have the best chance in the profitable manufacture of farina. The cheap production of potatoes in the United States has now become a certainty, so much so that they are largely exported. In one week alone this year 15,000 bushels were sent from New York to Havana. The immense extent of territory, the variable yet suitable climates, the accessible water-power, and, above all, unequaled mechanical resources, render the United States a favorable field for manufactures from agri-

cultural products, among which the conversion of potatoes into potato-flour is one of especial promise and importance.

A consideration of the average value of potatoes and of farina during the past twenty-five years enables one to calculate future results with a reasonable degree of certainty. If potatoes can be procured at $15 a ton, or less, the profit is increased as the cost is diminished; but if the price ranges from $15 upward, the loss is in exact proportion to their enhanced cost. Of late years, potatoes have ruled in certain sections of the States at $10 a ton and less, so that farina manufacture at present seems especially opportune, and the subject well worth appropriate investigation.

Farina is used for many purposes. Its most important use is for the manufacture of starch; in the production of which it competes with wheat, Indian corn, rice, sago, and other farinaceous substances. It is also used in calico-printing, for sizing, and for the manufacture of artificial gums, vermicelli, grape-sugar, sirups, confectionery, &c. But the chief use is for starch and sizing, for which purposes alone it is estimated that Great Britain could readily take 100,000 or 200,000 tons annually, as the other countries that produce it also consume it. As such a quantity is not yet forthcoming, an excellent market is available for American manufacturers of farina should it ever fail to receive remunerative appreciation at home. But whether sold as farina or converted into starch, the result is the same, so far as a steady and assured sale is concerned.

The potato gives a smaller percentage of farina than corn, yet, take it by the acre, the potato surpasses any other known product. This is a most important fact, and should be duly considered. To impress it, a scientific opinion will be of use:

> The quantity of starch in different grains and bulbous roots yielding this substance varies considerably, both in the percentage amount and gross total yield per acre; and these two circumstances must be taken into consideration by the manufacturer in selecting one in preference to another of the many sources whence the starch is extracted. Thus, while the potato affords centesimally only from fifteen to sixteen parts of starch, and wheat affords as much as 60 per cent., still the total amount *per acre* is in favor of the potato in the ratio of 2,400 to 996; the produce being estimated at 120 cwt. for the potato againt 16 cwt. for the wheat.

The average value of farina in Liverpool during the last five and twenty years has been $100 a ton. It takes three to four tons of potatoes to make one ton of the flour. It follows, therefore, that if three or four tons cost from $30 to $40, averaging $35, there is $65 a ton left for wear, tear, and profit, which is ample. This is taking cost of potatoes at $10 a ton; but, unless agricultural reports are false, there are many districts in the United States where even $5 a ton is nearer the figure for potatoes. What a magnificent outlet, therefore, does the farina process offer in such places?

During the war between France and Germany quite a new appropriation of farina was made by the French. The government purchased all they could lay their hands on, both in the continental and British markets, and mixed it with wheaten flour in the manufacture of "potato-cakes" for the use of the French army. The price of farina on this occasion rose to $200 a ton, and even at that price supplies became unobtainable. This fact has stimulated the use of it for like purposes throughout France, resulting in a greatly-increased consumption of farina and a consequent increase of farina-mills.

THE MANUFACTURE.

It may be stated that everywhere farina manufacture is in the hands of farmers. The manipulation is so easy and the results so methodical,

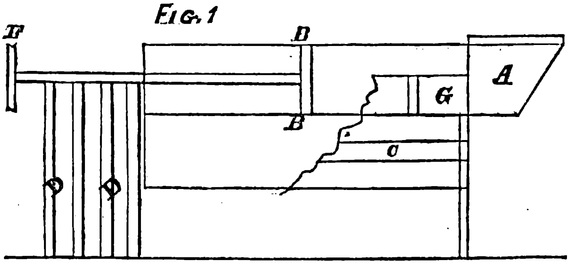
that ordinary farm-laborers can do all that is required, and the apparatus which is good to-day is good also twenty years to come; lastly, the manufacture can be carried on all the year round. The process of farina manufacture is exceedingly simple, and may be summed up in a few words.

Steeping the Potatoes.—This operation is preliminary to the washing, and is for the softening of the clay and other adhering gross matter. A large trough or vat is filled with water, in which the potatoes are allowed to steep during six to twelve hours, according to the quantity of impurities.

The Washing.—This is effected by mechanical means with the aid of steam or water power.

Figure 1 represents an elevatedview of the machine employed, which consists of a hollow cylinder, B B, constructed of laths of vood or iron laid longitudinally from one end to the other, the distance between each being such as to pernit of the escape of the dirt, stones, &c., whie the tubers are retained. The cylinder is charged from a hopper, A, at one end, and being slightly inclined; the washed potatoes are discharged at the opposite end, down the inclined plane D D. About a third of the cylinder is immersed in the water through C, wherein it revolves, and from the sides of which spring the boards G, slanting to the upper part of the cyinder, and intended to prevent the splashing of the water during the movement of the machine. This cylinder is worked by a board passing over the wheel F at the end of the axis and a drum-head of another shaft in connection with the main shaft of the engine. The inclined plane upon which the potatoes fall when thrown out conducts themto the rasping or grinding machine.

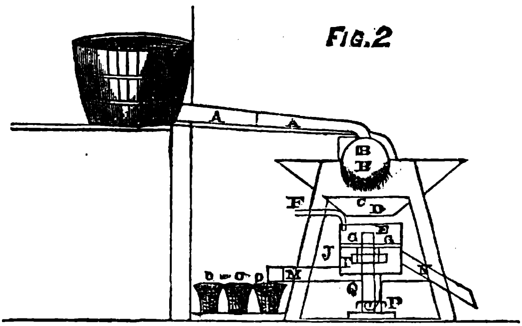
FIG. 1



Rasping or Grinding.—The object of the rasping is to reduce the tubers to a pulp, by which the cells containing the farina are ruptured; and the finer this grinding is effected the more freedom to escape will the fecula have. In some instances this operation is perfomed by means of a hand-machine, but generally large factories adopt a machine by which the rasping and the washing of the pulp are effected consecutively. The circular drawn bearing the rasp is turned by a winch-handle, and while revolving meets the tubers in the hopper, reducing them to a pulp, which falls by the aid of inclined boards into a vessel moving on wheels, and on which it is carried to the washing-stage.

A small stream of water is conducted on the upper surface of the rasp, with the view of keeping it clean from accumulation of pulp. The rasp itself is made of plate-iron, punched from the reverse side with an angular semi-circular or round tool on a yielding suppor, which allows the angular fractures of the iron on the under side to remain unflattened. With a machine of this kind, from two and a haf to three tons of potatoes can be turned into pulp by three men in twelve hours, and so on *ad infinitum.* The other kind of machine is shown in Fig. 2, in connection with a portion of the washing-apparatus. It consists of a cylinder, about 20 inches in diameter and the same in length, mounted

upon an axis. The cylinder is armed with steel saw-plates, placed at the distance of little more than three-fourths of an inch apart. The teeth of these saws, which are very small and regular and parallel to the cylinder, being held fast by iron clasps, project about four-fifths of an inch from the periphery of the drum, and the whole is turned with a speed of six hundred to nine hundred revolutions per minute. Such a machine, making on an average eight hundred revolutions per minute, reduces to a pulp from forty to forty-eight bushels of potatoes in one hour.



In the illustration the rasping-drum is shown at B B; the inclined plane, conveying the potatoes from the washing-machine, is indicated by A A, and the hopper into which the pulp falls by C, whence it is dropped into the washing-machine by the trapdoor D. The washing-apparatus for exhausting the pulp consists of a cylinder wire-gauze, E, fastened upon wooden or iron rings for support, and divided into two compartments, J L, each provided with a wire-cloth bottom, the lower finer than the upper one. The whole is inclosed in a sheet-iron or wooden covering, which prevents the escape of starchy waters from it when working. In the middle of the cylinder is a shaft, Q, carrying arms furnished with brushes, I I, which sweep the bottom disk of each compartment and force out the farina into a trough as the shaft is turned by the gearing of another one, P, acting upon a wheel appended to it at its base. By the very rapid revolution of the brushes and agitators in the drum, aided by the stream of water projected from the rose-head F, the pulp is speedily washed, the farina passing out at the sides and middle disk, G G, while the coarser pulp is thrown out by lateral openings, and is removed from the outer case by a door into the canal N. The finer portions of the pulp, which pass through the upper part of the machine, are separated in the lower one; the granules of farina falling through the fine meshes of the wire swept by the brushes into a trough, M, leading to the vats O O O, where the farina is permitted to deposit, while the fibrous matter is ejected by an aperture at the side, and removed through a door in the case to the canal N.

Purification.—The several filtrations and depositions above alluded to being effected, the milky liquor is allowed to flow into large settlers, where it is left to repose for several hours, till the whole matter in suspension falls to the bottom; the clear water is then siphoned off, and the brownish layer on the surface, consisting of fibrous particles, pulp, and other substances lighter than the farina, scraped off as clear as possible by an iron scraper. This impure farina is agitated with fresh water and then passed through a very fine brass wire or silk sieve, and allowed to rest for some time, till a further amount of white farina falls, when the same operation is repeated. It is further purified by stirring it with fresh water, passing the mixture through a No. 90 brass-wire sieve or one of silk cloth, conveying the milky liquid into a vat, allowing it to rest till the farina falls, then decanting and scraping the surface; and finally, if the mass be pure and of sufficient consistence, dividing

it into lumps, and placing these to dry either unsupported or in a conical wire-case.

Drying or desiccation.—Any building with shelves in it, that can be heated at from 60°, at which farina begins to dry, up to 212°, the extreme heat it should be submitted to, will do for this purpose, and the size of it can be arranged at will. Heating-apparatus and stoves are so well understood in this country, that any suggestions would be superfluous, and a store or chamber suitable for desiccating farina could be used for many purposes.

Packing.—In Europe, farina is packed in 200 or 212 pound fine sacks, but flour-barrels are far preferable. The wood protects the potato-flour from all damage, and admits of exportation to the antipodes, if required, while bags would afford poor protection in distant transportation.

ALFALFA.

The alfalfa of California, derived from Chili, is understood to be simply the lucerne of Europe, (*Medicago sativa*,) differing in habit of growth, if at all, only as a result of difference of soil and climate. It is a plant allied to the clover family. Loudon describes it as "a deep-rooting perennial plant, sending up numerous small and clover-like shoots, with blue or violet spikes of flowers." He speaks of it as a native of the south of Europe, of unknown antiquity in Spain, France, and Italy, but extensively grown also in Asia and in the province of Lima, South America. Columella estimates it as the choicest of all fodder-plants, because it continues to yield for many years without being renewed, and affords four, five, and six crops in a year. Flint states that it was brought from Media to Greece about five hundred years before the Christian era, whence its culture extended through the Roman empire to the south of France, where it has ever continued to be a favorite forage-plant. The more recent name, alfalfa, comes from South America, where, according to Flint, it grows wild in the utmost luxuriance in the pampas of Buenos Ayres. It is much cultivated in Chili, from whence it was introduced into California, and from which supplies of seed are still largely obtained.

Of the extent of its uses and the need of precaution in using it, in Europe, Loudon says:

> The principal and most advantageous practice is that of soiling horses, neat-cattle, and hogs; but as a dry fodder is also capable of affording much assistance; and as an early food for ewes and lambs, may be of great value in particular cases. All agree in extolling it as food for cows, whether in a green or dried state. It is said to be much superior to clover, both in increasing the milk and butter and in improving its flavor. In its use in a green state, care is necessary not to give the animal too much at a time, especially when it is moist, as they may be hoven or blown with it, in the same way as with clover and other green food of luxuriant growth.

Mr. Wycoff says, "For milch-cows it is superior to any other hay. It excites the secretions." He thinks that to make good hay for this purpose, it should not be cut before it has been in bloom ten days. He states that when grazed by cattle and sheep in the spring, while it is growing rapidly and is so abundant that they can gorge themselves quickly, it sometimes gives them the "hoven or colic," with fatal consequences. When grazed closely, no such evil occurs. He represents that it is benefited by being grazed moderately, as soon as the growth

is sufficient and the ground dry enough, and that cows are the best stock with which to graze it the first year.

Mr. C. F. Reed, speaking officially as president of the California State Board of Agriculture, states that cut when it is in bloom it makes hay of good quality for stock of all kinds, but especially for milch-cows; that, according to the testimony of good dairymen, cows taken from the native grasses and pastured on it will increase in product of milk, butter, and cheese from 60 to 70 per cent., and that, in the opinion of the best of sheep-growers, sheep grazed on it in a constant green condition will be free from the diseases of the skin so prevalent in California.

It has two characteristics which especially adapt it to regions subject to long-continued hot and dry weather. These are its very prolific and rapid growth, by which, after being cut, it very quickly shields the surface by a thick green coat, and the astonishing depth to which it sends down its carrot-shaped tap-root. In the Kern Valley, California, the roots go down to the water-line, which is 12 to 20 feet below the surface. This accords with a statement published in our annual report for 1873, page 237, that, where a freshet had exposed a perpendicular section of an alfalfa field, the roots were found extending down to the water-line, which was from 12 to 20 feet below the surface. In this country, the climate is generally favorable to its production from the extreme south to the latitude of Washington. It presents a remarkably luxuriant growth in the grounds of the Department of Agriculture. Farther north it thrives well only in favorable localities. It is reported as doing well in Nevada and Nebraska, also in Utah and Colorado Territories. It will not thrive in a compact clay-soil, or any shallow soil with a hard-pan subsoil. It prefers a rich sandy loam, well drained, with a permeable subsoil. The seed requires a shallow covering, after deep and thorough pulverization of the soil. Broadcasting and drilling are both practiced, but if the land is foul, the latter mode is decidedly preferable, as it admits of careful culture until the crop is able to displace the weeds.

The culture in California was begun on a basis of 15 pounds of seed per acre, but the results of trial for a series of years have clearly proved that a larger amount is better, not less than 20 pounds, and from that up to 30. While thin seeding results in coarse stalks, invites weeds to compete for the mastery of the field, and exposes the surface to the baking influence of the hot sun and drying winds, thick seeding operates as a preventive of all these evils. The editor of the Pacific Rural Press gives these general directions:

> In districts subject to spring frosts, defer sowing until there is no longer any danger from this quarter. Plow deep, harrow mellow and fine, brush the seed in, and roll with medium-weight roller. The seed should not be put in deep, and it is desirable that it be well covered, (not by lumps, however,) and that the fine soil be brought all about the seed; brushing and light rolling will do this. If the above principles and precepts are properly considered and practiced, and the field receives such subsequent treatment as any good pasture or meadow ought to receive, it will not need reseeding for twenty years. When it has made a good stand, cut it, but do not draw too hard on it; the first season two crops should satisfy you. After this, you may safely increase your demand, cutting as often as it makes a fair stand; but you should bear in mind the fact that some return should be made in the form of fertilizers. Alfalfa is a free horse, but don't ride it to death.

Prime alfalfa-seed was quoted at San Francisco in the spring of 1875 as worth $20 per 100 pounds, while an inferior grade could be bought as low as 9 cents per pound. The amount of seed required per acre varies somewhat with the soil and climate.

Alfalfa will thrive without irrigation where any cultivated grass or grain will succeed; and it is claimed that on a suitable soil, after the

roots have had time to work down to the water-line, requiring from one to two years, it will thrive without any irrigation in the driest and hottest climate. The Pacific Press affirms that for this reason it has already "become the *favorite*, and will become the *standard* grass of California." Mr. Jewett reports that in the Kern Valley, where all crops require irrigation, alfalfa needs but little after the first year, and none after the second.

The increase of area in alfalfa in California is very rapid, and the crop is already of considerable money-value, though only affording a mild suggestion of its ultimate pecuniary importance. It finds congenial soil in nearly all the valley-lands of the State, but is especially adapted to the southern portion of the great interior basin. From the statement of our correspondent in Kern County, Mr. S. Jewett, we infer that not much less than 10,000 acres are already devoted to this crop.

Under date of November 24, 1875, he reports that Messrs. J. B. Haggin and William Carr, of San Francisco, who own 125,000 acres in Kern County, sowed with alfalfa last year about 2,000 acres, and will put 3,000 to 4,000 more this year. Messrs. Livermore & Louther are seeding their ranch of 8,000 acres as fast as they can, and James Dixon has seeded about 1,000 acres. Mr. Daniel Tracy has 106 acres, from which he has cut and sold 400 tons, at $12 per ton, delivered at the station. He has on hand 200 tons more, and has let the field for pasturage for $650. He thus obtains about $74 per acre. Mr. P. D. Jewett has 150 acres, Jewett & Anderson 250 acres, and our correspondent 250. He estimates that there are in this county at least 500 acres more, all of which gives at least 8,000 to 10,000 acres as the present area in alfalfa in Kern County. Nearly all above specified is within fifteen miles of Bakersville. Our correspondent says:

Alfalfa can be cut three times the same season in which it is sown. We sow at any time, from the 1st of November until the 1st of May. We find that the frosts do not injure it. It does well in the State of Nevada. There are large fields of it near Reno, in the Truckee River Valley. They have there heavy frosts and snow during a portion of the winter, and the cold does not affect it. A party sent seed from here to Nebraska, and has received word that it withstood the winter and was a month earlier than any other feed. All kinds of stock do well on it.

Mr. L. B. Reeder owns a farm near Bakersville, which, in 1874, was let on shares. It contains 135 acres—60 in alfalfa, 5 in vineyard or orchard, and 70 in timber or uncultivated. A part of the alfalfa was cut for hay, a part pastured by 20 cows, from which the milk was sold at 50 cents per gallon, and a part let for pasturage, at $2.50 per month per head. He reports that the net profits of the farm amounted to $3,500, or nearly 26 per cent. its value, at $100 per acre, with less than half in cultivation. Mr. John Shirley Ward, of San Bernardino County, reports the following results of his first year's experience with alfalfa. His ranch, in 1874, had 7 acres in it, and he sowed 63 acres in addition. From the 7 acres he sold four hundred dollars' worth of hay, and from 5 of the same saved seed, which, after deducting toll for thrashing, amounted to 1,204 pounds, worth 14 cents per pound, making the gross income $568.56. The entire expense was a little less than $100, leaving about $67 per acre as net profit. Reporting the 1st of June, 1875, he states that he had already put up about 100 tons of well-cured alfalfa hay, the expense, at the highest price for labor, &c., being $1.43 per ton. That hay was worth, in the stack, not less than $10 per ton. He estimates that 100 acres of his ranch will yield at least 500 tons of good alfalfa hay. He practices irrigation. As illustrating the grazing capacities of alfalfa, he states that in the fall of 1874 he grazed for twenty-two days

on 20 acres 1,500 sheep. Beginning at the upper end of the field, the water was turned on each successive section as soon as it was eaten off. At the end of the twenty-two days, when the sheep had reached the last section, the new growth on the first was 8 to 10 inches deep.

Advanced agriculturists in the cotton States have strong faith, corroborated by successful trials on a limited scale, that this plant is adapted to their climate, soil, and wants, and that its general introduction would contribute vastly to their agricultural prosperity. There are indications that the foothold it has already gained, in various localities in those States, will result, and that soon, in rapidly extending its culture.

Our correspondent in Dallas County, Texas, reports that, upon trial, alfalfa proves to be admirably adapted to the black prairie soil of that region. It withstands well both the drought of summer and the cold of winter, keeping green all the year round. Last season he cut a crop on the 10th of April, a second crop from the same field on the 3d of May, a third on the 4th of June, and each crop averaged about two tons per acre.

FRENCH MODE OF CURING FORAGE.

Sour forage for stock is everywhere in Europe coming into use. The fermentation in pits, of maize, straw of cereals, and other forage material has become quite popular in France, and it is practiced in Germany, Austria, and Hungary by the stock-growers of these countries. This process of *ensilage* is attracting so much attention in Europe, and so commending itself by the profits which it insures, that a more thorough and complete exposition of its peculiarities and advantages than has hitherto been made in this country, seems especially desirable, though repeated references have been made to it during the past year. It is possible that conditions favorable to this practice may be found to a limited extent in this country. A large place in the French system of agriculture is awarded to "industrial plants," or plants grown for some specific manufacture. Prominent among these is the sugar-beet, which, though cultivated previously for the manufacture of sugar and alcohol, yields a great mass of invaluable matter for stock-feeding, and is a very prominent and profitable resource in meat production. A leading French agronomist estimates the yield of the sugar-beet in this regard at from 40,000 to 50,000 kilograms per hectare, or from 17.84 to 22.30 tons per acre, leaving, after the extraction of the sugar, a residuary pulp of 20,000 to 30,000 kilograms per hectare, or from 8.92 to 13.38 tons per acre, which, for feeding purposes, is equal to a crop of common hay averaging from 3 to 4½ tons per acre. The sugar-beet, however, is grown with but partial success in Central France, while, in the still more arid regions of the south, its culture is seldom or never attempted. Agriculturists of the central departments have long been seeking a plant which will perform in their region the economic function of the sugar-beet in the north. They hope and believe that, by the new process of *ensilage*, the maize-plant will supply the great desideratum. The crop is sown like wheat, and harvested in its green state. It is then buried in pits, and thus preserved for the winter feeding of farm-animals. From the numerous successful experiments detailed by the French agricultural press for two years past, and the careful scientific analyses of

the material after preservation, the hope appears to have been realized A great mass of perishable material, rich in the elements of animal nutrition, is thus redeemed from waste, and the winter-feeding of farm-animals greatly cheapened.

ORIGIN OF ENSILAGE IN FRANCE.

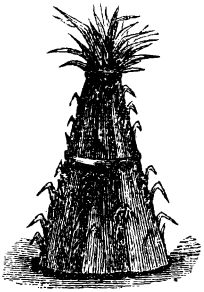
This term, derived from *silo*, a pit or trench, indicates the process of storing green maize in the soil. The French imported it from Germany. In June, 1870, M. Vilmorin called attention, through the Journal Pratique d'Agriculture, to the experiments of M. Adolph Reihlen, the proprietor of a large beet-sugar factory near Stuttgardt. This gentleman having successfully tried the process in the preservation of sugar-beet pulp, was induced to apply it to a very large crop of green maize which had unexpectedly fallen to him. The result was an astonishing success, and the process has been repeated for fifteen years with increasing satisfaction. In the Journal Pratique of November 20, 1873, M. Reihlen, in answer to the request of leading French agriculturists, gave a brief exposition of his method. Its essential features embrace a ditch 5 feet deep and 12½ feet wide at the top, sloping to 10 feet at the bottom. The maize, cut green, is allowed to dry for two or three days in the hot sun and then closely packed in parallel layers, great care being taken to compress them within the smallest possible space, and to exclude the atmosphere entirely. The fodder is piled in a pyramidal ridge about 8 feet above the surface of the ground, and covered with 3 feet of earth, by the weight of which, supplemented by the trampling of horses, cattle, and cart-wheels, the whole mass is compressed nearly within the trench. M. Reihlen regards the trampling as unnecessary, as during a single night the fodder by its own weight sinks 3 feet; the 3 feet of soil then supplies all the needed pressure. It was to meet this pressure that the sides of the pit were made oblique. In the first experiments, with perpendicular sides, a portion of the outside fodder was spoiled. For several days after covering the irregular sinking of the mass will cause the superincumbent earth to break into fissures, which must be carefully filled up. M. Reihlen's exposition gave a great impulse to experiments in France, both in the high culture of maize as a fodder-plant and in its preservation by *ensilage*.

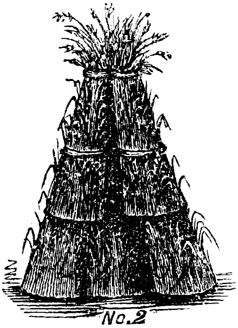
The Société des Agriculteurs de France has founded a prize fund, the proceeds of which were to be distributed in 1876 and following years in awards to the best and most economical processes of preserving green forage during the year. The drought of 1874, especially in the early part of the season, made short fodder crops, and impressed the necessity of some expedient by which the deficiency could be supplied. The process of *ensilage*, though but partially tested in practice, opened up a prospect of relief by utilizing the last weeks of the season in the production of large crops of green corn-fodder. Then the experiments of intelligent agriculturists in different departments were brought into notice and their results eagerly sought. Several of these, being men of scientific as well as practical training, were able to give such information as average French farmers could appreciate. Their articles in the agricultural journals attracted special attention, and the *ensilage* method was adopted on a considerable scale. Its popularity is still increasing, and it may be regarded as one of the characteristics of French agriculture in coming years.

OLD METHOD OF CURING FODDER.

The common maize, at deflorescence, or the Caragua maize, at florescence, was cut with a sickle during fine weather, in September, and left

two or three days in bundles on the ground. They are then bound together in sheaves of 20 to 50 pounds each, with a stalk of the dried maize, and placed upright, their lower ends being spread out like a tripod. In this position, they lose about half their weight by desiccation. From ten to a dozen of these sheaves are then ranged in conical bundles called mats. Those varieties of maize which grow short stalks are ranged in tiers, as in the accompanying figures, (2 and 3.) The Caragua


No. 1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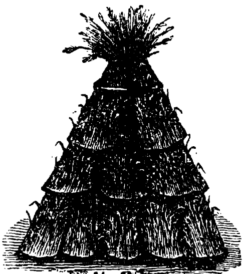

No. 3

maize, however, is too tall for such an arrangement, and hence is packed in single tiers as shown in figure 1. The Caragua maize is cut at florescence, for the reason that if the plant is allowed to pass through the flowering stage its development of woody fiber would be too great. If the weather be rainy, the mats are made smaller and more accessible to the air. This method is very well calculated to shed both rain and snow and to preserve the fodder from spoiling. It will still be practiced for a part of the crop, while the main portion will be cured by *ensilage.* M. Crevat, of the department of Ain, feeds his cattle with green maize, freshly cut, from July 20 to October 20; from October 20 to January 20 he uses the mats, and afterward the fodder exhumed from the *silos.* To preserve a crop of 22 tons of green fodder, the produce of a single acre, in mats, will cost about 61 francs. Figures 1, 2, and 3 sufficiently illustrate this method.

USUAL METHODS OF ENSILAGE.

M. Crevat, after several years of experiment, has settled upon pits of the following dimensions: Depth, 2.30 meters, (7.55 feet;) length, 8 meters, (26.25 feet,) at the surface of the ground, sloping down to 7.40 meters (24.28 feet) on the bottom; breadth, 2.60 meters (8.53 feet) at the top, and 2 meters (6.56 feet) at the bottom. Each pit has a capacity for about 40 cubic meters (about 1,412⅔ cubic feet) of fodder. M. Crevat has found reason to deepen the trenches and to contract their width, in order to lessen the expense of covering them with earth. The sides and ends are sloped, in order to allow an oblique, as well as a vertical, pressure from the superincumbent earth, and to make the upper surface of the fodder convex. In each of these pits about 10½ tons of green fodder may be packed. Two or three days' drying in the hot sun will reduce it about a third in weight. Many farmers prefer to dry the material in order to render it more easy of transportation. The trench is filled and the fodder piled up above the ground to a height equal to its depth under the surface. The earth is then thrown upon the mass before fermentation commences. Two feet depth of soil will depress the pile

at least a yard by simple pressure. After some days of fermentation it shrinks to less than half its original volume. The weight of the material, by condensation, increases from about 800 pounds per cubic yard to over 2,000 pounds.

FIG. 4

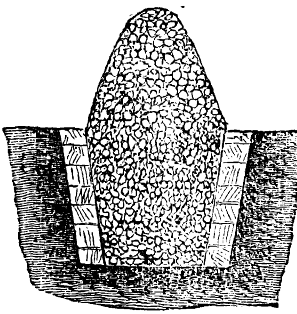
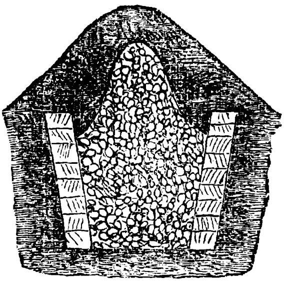
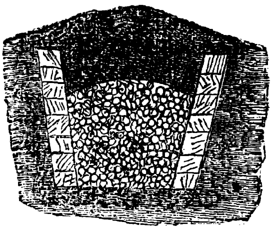


FIG. 5



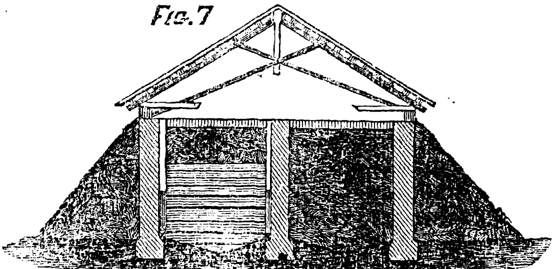
In some cases, the *silos* are mere pits, with walls of bare earth. In other cases, they are lined with brick or cement, either on sides or bottom or on both. Where the soil is excessively damp, the walls are built entirely or partially above the surface, and embankments are made for their support. It is found necessary to exercise special care in covering the pits to entirely exclude the air. The dislocations in the fermenting fodder will often open fissures through the covering soil, and the air thus admitted will transform the process of fermentation into one of putrefaction. Sometimes decidedly alcoholic fumes have been given off through the crevices in the covering. One case is noted in which the *ensilage* entirely failed, on account of using sand instead of earth as a covering. Different opinions prevail in regard to the propriety of cutting or chopping the maize into small fragments before packing in the trenches. In case the maize has become over-ripe, it is urged that cutting facilitates fermentation, which will render the harder portions as easy of mastication and digestion by farm-animals as the softer portions.

FIG. 6



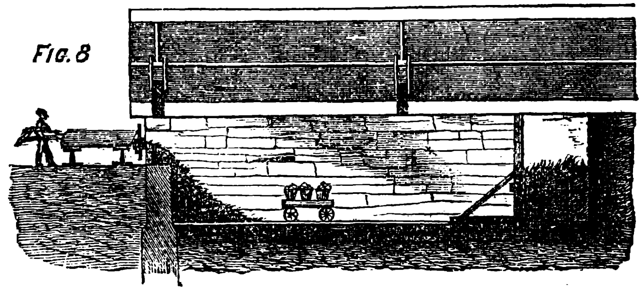
A more elaborate exposition of this method is given by M. Piret, as practiced upon the farm of M. Houette, proprietor of the chateau of la Mothe-Jarry. The *silos* in this case were constructed of brick-work on top of the ground, and supported by embankments. Fig. 7 presents a transverse section showing two *silos* with a partition-wall and a shed roof. On the left is shown one *silo* packed, and on the right another in process of packing. Fig. 8 shows a longitudinal section illustrating the manner of packing. On the right is shown a portion of

FIG. 7



the *silo* already filled. A movable partition, consisting of planks placed successively in grooves of two movable upright timbers, with a brace mitered into a horizontal timber, laid in the floor, allows the packing of the *silo* in successive sections. A portable railway is represented with a small platform-car, upon which the baskets are trans ported for packing at the other end of the *silo*. On the left is the cutting-machine, from which the chopped maize is falling. When a section is filled, the partition is removed backward about two yards, and another section is packed in like manner. The packer, by the full weight of his body, compresses the mass into as small compass as possible, As each section is filled somewhat above the top of the walls, it is covered with a stratum of clay, from 8 to 10 inches thick, and strongly beaten. This beating must be frequently renewed, as fermentation, causing shrinkage in the fodder, tends to open fissures in the earthen covering. This method keeps the material sound and good throughout the winter. On being taken out of the *silos* in spring in quantities too large for immediate consumption, it soon betrays a tendency to alcoholic fermentation. This, however, is not noticed in regard to the fodder just taken from the *silo* in any case where it had been perfectly protected from the atmosphere. The wooden shed is for protection against rain; the ground should slope in every direction from the edges of the *silo*. This will insure the fodder against moisture.

FIG. 8



M. Lecouteaux, editor of the Journal Pratique, in a special treatise upon the "culture and *ensilage* of maize," suggests modifications in the process. The fodder is piled to the height of 2 meters, (6.56 feet,) upon a surface either convex or concave, and the earth taken from trenches alongside thrown upon the pile. The transverse section shows a truncated triangle; the thickness of the earthen covering varies from 18 inches to 2 feet. M. Lecouteaux contends that the wooden covering shown in the previous example is unnecessary, and claims a great economic advantage in the easier access of the wagon or cart to the fodder when it is to be exhumed for consumption. Considerable stress is laid upon this point by several experimenters.

EFFECTS OF FERMENTATION IN THE SILO.

French agricultural chemists have been investigating the changes wrought by fermentation in the buried fodder, and several valuable and important results have been already attained. M. Grandeau, director of the Agronomic Station of the East, assisted by his chemist, M. Leclerc, has subjected the buried fodder to chemical analysis, and has published some very clear and coherent facts in regard to it. Among the points specially raised is the policy of pitting the maize alone, or associated with straw. This has given rise to a considerable controversy, in which, as is usual in new investigations, dogmatism is in inverse proportion to knowledge or experience. It was partly to test this point that M. Lecouteaux sent to M. Grandeau for analysis specimens of fod-

der preserved by both methods, as well as of straw and chaff. The following are the comparative results of these analyses:

	Green maize.	Maize free from straw, preserved in silos at Chateau Bertin.	Maize mixed with straw, preserved in silos at Cerçay.	Straw and chaff from Cerçay.
Water	81.28	81.28	60.71	14.50
Sugar	0.58	0.15	1.89	....
Azotized matters	1.22	1.24	3.74	4.88
Non-azotized matters	10.40	9.58	14.59	34.52
Fatty matters	0.25	0.36	1.50	1.50
Crude cellulose	4.98	4.91	8.70	35.50
Ashes	1.29	2.25	8.43	9.10
Acid	....	0.23	0.44	....
	100.00	100.00	100.00	100.00

M. Grandeau gives proportion of azotized to non-azotized matters as follows: In green maize, 1 to 9.24; in maize preserved free from straw, 1 to 8.14; in maize preserved mingled with straw, 1 to 4.81; in straw, 1 to 7.38.

The fodder preserved with straw at Cerçay shows a remarkable reduction in its percentage of water, which may be accounted for by the low percentage of water in straw. It also shows a saccharine element three times greater than that of green maize, while that preserved at Bertin free from straw retains but a fourth of its original quantity. The Cerçay fodder also tripled the amount of azotized matter in the green maize, finding a large supply in the associated straw, while in the Bertin specimen it was but slightly increased. Again, the Bertin fodder decreased its proportion of non-azotized matter, while that of Cerçay borrowed largely from the straw. Both kinds of preserved fodder enlarged their proportion of fatty matter; that of Bertin less than 50 per cent., and that of Cerçay sixfold. Of crude cellulose, the Bertin shows a slight decrease, while the Cerçay about doubled its percentage. The proportion of ash increased twofold in the Bertin, and nearly sevenfold in the Cerçay. Both kinds showed a perceptible development of acid, acetic and lactic. In the Cerçay fodder, the maize was mixed with half its quantity of straw. As the result of his investigations, M. Grandeau came to the conclusion that the combination of straw with maize added very considerably to the nutritive value of the fermented fodder.

In a subsequent statement, M. Grandeau explains that the specimen called green maize in his analysis was partly desiccated by contact with air and sun-heat. This would more particularly affect its percentage of water. From a specimen freshly cut, he obtained, by analysis, the following percentages: Water, 86.20; sugar, 0.43; azotized matter, 0.90; non-azotized matter, 7.67; fatty matter, 0.18; crude cellulose, 3.67; ashes, 0.95.

M. Grandeau's conclusion in favor of the mingling of straw with the maize called forth considerable criticism, but after a careful reconsideration of the question he still adhered to his opinion. The transformation of the buried fodder embraces two important elements of advantage: 1.

The transformation of a part of the starch and cellulose into sugar; 2. The enlargement of the azotized matter by the destruction of a portion of the fecula and of the cellulose.

A specimen of preserved fodder, of which 6 per cent. was straw, analyzed by M. Banal, showed 79.85 per cent. of water; sugar, 0.68; fatty matter, 0.77; nitrogenous matter, 1.69; starch, 6.54; cellulose, 4.82. The proportion of nitrogenous to non-nitrogenous matter was as 1 to 7.20. It shows the same tendencies as the Cerçay mixed fodder, but its smaller proportion of straw accounts for less marked increase of saccharine and nitrogenous matter.

Some farmers use a considerable quantity of salt in packing their fodder, but this is stated to be not for the preservation of the food, but to render it more palatable to the animals.

COMPARATIVE YIELD AND VALUE OF MAIZE FORAGE.

French agronomists estimate the average yield of maize in the maize-growing departments of France at 60,000 to 80,000 kilograms per hectare, or 26.76 to 35.68 tons per acre of freshly-cut fodder. It rapidly loses weight, however, from the evaporation of its water in composition by the air and hot sun. If this mass of green matter can be cured so as to be available for winter feeding, it is easy to see that the stock-raising interest of France has gained a very important economic advantage. Maize has till lately been raised chiefly as a bread-plant, and, consequently, on a small scale, as an alternate in a biennial rotation with wheat. Its use as a fodder-plant, however, may modify essentially the system of culture, and bring it into a wider and more scientific rotation; that is, a greater diversity of crops and a more elaborate agricultural production, assimilating that of the northern departments, will be introduced into the maize-growing regions. The lead in this movement has been taken by chiefs of farm-schools and other scientific farmers trained to a careful observation and appreciation of facts and principles. The seed is sown both broadcast and with the drill, and the comparative results are being closely scrutinized.

Already immense yields of maize by high culture are announced in different quarters. M. Moreul, a leading farmer in Mayenne, graduate of the regional school of Grignon, and for a long time director of the farm-school of Camp, easily obtained 80,000 kilograms of green maize per hectare, or 35.68 tons per acre, by using barn-yard manure to the extent of 22 to 27 tons per acre.

M. de Kerjégu, founder and director of the farm-school of Kerwazek-Trevarez, in the department of Finisterre, upon a schistose, sandy soil, strongly re-enforced with lime, and enriched with barn-yard manure and superphosphates, reports crops of 100,000 to 150,000 kilograms per hectare, or 44.61 to 66.91 tons per acre. The seed used in this experiment was the Caragua or Giant maize. M. de Kerjégu considers even 200,000 kilograms per acre, or 89.22 tons per acre, a result of possible attainment under favorable conditions of soil, culture, and fertilization.

M. Goffart, of the department of Loir-et-Cher, sowed rye in September, 1873, and harvested the following season 7.14 tons of grain and straw per acre. He then sowed Caragua maize, from which he harvested a crop of green fodder averaging 120,000 kilograms per hectare, or 53.53 tons per acre; some portions of the field yielded 25 per cent. more. The rye received barn-yard manure at the rate of about 13 tons per acre, and was sprinkled in the early spring with a mixture of three parts of superphosphate and one part of sulphate of ammonia at the rate of 357 pounds per acre; the maize received no additional fertilization.

M. Lecouteaux, in the Journal Pratique d'Agriculture, summarizes the comparative maximum yields of different fodder-plants as follows:

	Grass yield per acre.	Equivalent in hay.
	Tons.	*Tons.*
Caragua maize	66.96	16.73
Sugar-beets	35.68	11.63
Ray-grass with liquid manure	35.68	8.97
Marcite meadows of Italy	28.85	7.21
Rutabagas	21.41	5.35
Potatoes	9.81	4.90
Cabbages	17.84	3.56

Of course, these are to be considered as extreme results, involving the investment of large amounts of capital and labor.

CULTIVATION AND FERTILIZATION.

The method of *ensilage* has been applied to several varieties of maize in France. The varieties in common use gave way first to the "horse-tooth," and then to the Caragua or Giant maize. The latter is noted for its immense product of green forage, but its heavy draughts upon the soil must be met by generous fertilization and scientific rotation and culture. Like the sugar-beet in the north, it will soon supersede the dead fallow. The stubble-breaking of summer will follow the deep plowing and heavy manuring (17 to 22 tons per acre) of autumn. Leading agriculturists advise that the field be harrowed and rolled in March and April, preparatory to the sowing in May. For fall consumption, successive sowings will provide abundance of fresh fodder. Crops intended for *ensilage* should be sown so as to ripen simultaneously. The sowing should be timed so as to escape both the spring and fall frosts. At the late session of the Société des Agriculteurs de France, the weight of opinion was in favor of drilling as opposed to broadcasting the seed. The latter requires too much grain, which materially enhances the cost of putting in the crop. Further, a broadcast crop gives no facilities for hoe or spade culture, and hence maize so seeded loses its character as a soil-cleaning and mellowing crop. For *ensilage* crops it was proposed that the rows should be from 16 to 24 inches apart and the plants in the row from 12 to 16 inches apart. This wide planting is especially necessary to the full development of the Caragua or Giant maize, which has superseded all other varieties for winter-feeding. Care sould be taken to render the growth as uniform as possible, especially in case the maize is not to be chopped before pitting. It was recommended that the grain be sown with a drill at the rate of 60 to 80 liters per hectare, or 2¾ to 3½ pecks per acre. Prior to sowing, a mineral fertilizer—three-fourths superphosphate of lime and one-fourth sulphate of ammonia—at the rate of 400 kilograms per hectare, or 357 pounds per acre, is recommended.

An approved practice, by M. Goffart, in the crop previously noted of 120,000 kilograms per hectare, is thus stated: The maize was sown upon rye-stubble, the rye having been cut for *ensilage* without thrashing. The stubble-field was lightly stirred with a mold-board, and the seed was dropped after the plow at the rate of 60 kilograms per hectare, (53.33 pounds per acre.) The ground had been treated with 13⅓ tons per acre of barn-yard manure in the fall and with 357 pounds of superphosphate of lime and sulphate of ammonia in the early spring. The rye had yielded at the rate of 16,000 to 18,000 kilograms per hectare, (7 to 8 tons per acre,) including grain and straw. M. Goffart was skeptical as to the exhaustive character of maize, his third successive crop being

fully equal to its predecessors. He insists upon chopping the maize very fine and packing it very tight in the *silo*. He mixes it with rye-straw and chaff, in order to absorb the watery element. He cuts his fodder with a steam-cutter of 5-horse power, cutting from 90 to 100 cubic meters per day, at a cost of about 13 francs. The cost of harvesting and pitting he estimates at from 1 to 1.10 francs per ton.

M. Louis Pasquay, of Alsace-Lorraine, commenting upon the results of M. Goffart, estimates the soil-exhaustion of his crops of rye and maize, according to the late analysis of Wolff, as follows:

	Potassa.	Soda.	Magnesia.	Lime.	Phosphoric acid.	Nitrogen.
	Kilo.	*Kilo.*	*Kilo.*	*Kilo.*	*Kilo.*	*Kilo.*
1,000 kilograms of maize	4.3	0.5	1.4	1.6	1.3	3.2
1,000 kilograms of rye	6.3	0.1	0.5	1.2	2.4	4.3
120,000 kilograms of maize	516	60	168	192	156	384
18,000 kilograms of rye	113	18	9	21	43	77
Total exhaustion per hectare	629	78	177	213	199	461
ELEMENTS SUPPLIED BY THE FERTILIZERS.						
30,000 kilograms of barn-yard manure	150	30	50	240	60	150
300 kilograms of superphosphate of lime	......	......	2	63	60	12
100 kilograms of superphosphate of lime	......	......	......	......	......	20
	150	30	52	303	120	182
Excess after cropping	......	......	......	90	......	......
Deficiency after cropping	479	48	125	......	79	279

These figures indicate an exhaustion of the mineral elements of the soil, except lime, over and above the supply furnished by the fertilizers used by M. Goffart. The deficiencies above noted amount to the following averages per acre: Potash, 427.37 pounds; soda, 42.83 pounds; magnesia, 111.53 pounds; phosphoric acid, 70.48 pounds; nitrogen, 248.98 pounds. Lime is supplied in excess of loss to the extent of 80.3 pounds per acre. M. Pasquay suggests that fertilization for maize-fodder production should be particularly directed to the supply of these missing elements which are found in the Mediterranean and Stassfürt salts. Nitrogen is probably supplied to some extent by the atmosphere.

M. Goffart enlarges the supply of phosphoric acid by mixing through his manure-pile a quantity of phosphate of lime, which he thinks is absorbed to the extent of 2 pounds per cubic yard. Potash and soda exist in unusual quantity in the soil. To these facts he attributes in part his continued success in raising immense crops of maize forage.

M. Grandeau, in a subsequent analysis of the ashes of the Caragua maize raised by M. Goffart, found the following constituent elements: Phosphoric acid, 7.37 per cent.; sulphuric acid, 3.52; oxide of iron, 2.10; lime, 13.15; magnesia, 8.75; potassa, 20.45; soda, 4.40; carbonic and salicic acids with other elements undetermined, 40.46.

Several formulæ for chemical fertilizers are in use among the French farmers, in which superphosphate of lime, sulphate of ammonia, nitrate of soda, &c., are combined with specific preparations. The subject of fertilization is receiving special attention in its relation to the maize-forage crop.

VALUE OF THE PRESERVED FODDER IN STOCK-FEEDING.

M. Pasquay has deduced from late results obtained by German Agricultural Stations some facts in regard to the value of different fodder-

plants. Maize fodder (green) has a feeding-value equal to 22 per cent of that of hay; rye fodder, 38 per cent.; grass, (green,) 34 per cent.; wheat-straw, 48 per cent. In a good forage-ration for a milch-cow, the ratio of nitrogenous to non-nitrogenous matter should be as 1 to 5, or even as 1 to 4.5; for young animals, weighing between 250 and 300 pounds, as 1 to 3.3; for animals of 450 pounds, as 1 to 4; for oxen in absolute repose, as 1 to 8. Maize-forage cut green does not meet this requirement, as it shows a proportion of 1 to 9.24. The maize preserved with a mixture of straw, as at Cerçay, approximates the standard, showing proportion of 1 to 4.81. Its increased per cent. of fatty matter represents also a great advantage, being six times greater than in the green maize.

M. Goffart finds that his preserved fodder is sufficient without any other food to keep his animals in fine condition. M. Houette, of the department of Yonne, has found by experience that the maize should be cut for preservation in *silos* as near as possible to its maturity, when it is more nutritive, the ears more developed, the stalks more firm, and the watery element less predominant. Being finely chopped before pitting, its fermentation in the *silo* will soften it and render it as palatable to animals as the freshly-cut maize. He has been able to keep stock upon it to the last of May, and once as late as July, the fodder being in a condition but imperceptibly changed from that of its primary fermentation in the *silo*. Some question has been raised as to the propriety of feeding fodder spoiled in the pits, but while no indications of injury from feeding it have been developed, it is justly considered that it is more available as a plant-food than animal food; hence it is thrown upon the manure-pile.

In France, that is considered good culture which supports one head of cattle or one horse per hectare, (2.47 acres,) while that which requires 2 hectares for each animal is esteemed as only tolerable. It is anticipated that the number will be raised to 5 head per hectare, or 2 per acre, when the *ensilage* method shall have become thoroughly and practically understood. Two hectares in maize, in a farm of 10 hectares, (24.7 acres,) will be able to maintain 10 head of cattle or horses, affording a very large amount of stable manure for the crops grown on the 8 hectares, as well as for the maize itself. Each of the other hectares will be able to maintain one head, thus making 18 head for a farm of 25 acres. This looks to an immense increase of meat production, and to the more general use of animal diet by all classes of society. The Bank of France has of late extended its facilities to farmers and stock-raisers, a change of policy which promises well for this improvement of the agricultural interest.

ENSILAGE OF OTHER FODDER PLANTS.

The success of *ensilage* in regard to corn has suggested its application to other fodder-plants, such as rye, ray-grass, colza, rape, red clover, and autumnal vetches. This movement is expected to meet the case of a failure of green food from droughts in June and July. M. Lecouteaux has made a successful experiment of this character at Cerçay. One *silo* was filled with rye cut the last of April, at the time when the grain was forming, and red clover, in the proportion of four parts of rye to one part of clover. The second was composed of three parts of rye, riper and less soft, and one part of the clover; the third, with two parts of rye of full growth, yellow at the roots and white in the grain, and one part clover. The *silos* were about the usual size, and were covered with earth about 13 inches deep, the crevices being carefully filled up as soon as discovered. The sides and bottoms were lined with heather and

straw. The rye had been chopped in lengths less than an inch, but the clover was left uncut. The two plants were arranged in alternate layers, well trodden. Salt was applied at the rate of three pounds for each 1,000 of the mass. The first *silo*, filled April 23 and opened May 22, showed a subsidence of about 2½ feet in depth. The fodder was moldy for about 6 inches below the ridge and at the ends of the *silo*. Along the walls the moldy stratum was but half as thick. Hence the propriety of lining the *silos* with material of little value, such as straw or heather, in order to absorb the escaping gases. The first *silo* contained the most nutritive fodder. It gave off alcoholic odors, and the color had changed from green to greenish brown. The rye had become very soft, while the clover had retained its form, color, foliage, and flowers almost complete. The animals greatly relished the mixture, especially the clover. The second *silo* was less successful, probably from the overripeness of the rye, and the excessive amount of woody fiber contained in it. The third *silo*, in which the clover was in largest proportion, was excellent, of good color, and alcoholic flavor. M. Lecouteaux, from this experiment, concludes that rye should be used before the grain becomes hard, and that it should be mixed with one-quarter or one-third of clover. He fed this fodder to working-oxen at the rate of 53 pounds per day without any other food, and they pursued their regular work in good condition. Milch-cows were fed 24 pounds per day, and then turned out to the scanty pickings of the arid pastures.

Thus it appears that maize will not occupy the exclusive attention of farmers as a material for *ensilage*. An intelligent writer protests against the exclusive culture of this or any other plant. He insists that the increase of maize should not be at the expense of other fodder-plants. The value of the sorghum for preserved fodder is also strongly urged.

ENSILAGE IN OTHER PARTS OF EUROPE.

This process is applied in Spain to maize and other plants, and even to leaves of trees and vines in seasons of short fodder-crops. It has been for seventy years employed in Austro-Hungary and for ten years in Germany, but in a less elaborate form than in France. No mixture of straw is practiced. Supplementary coverings of straw or of timber-sheds were formerly used, but have been discontinued as unnecessary. The fodder is pitted in all kinds of weather that will admit of its transportation. It has been observed that rain falling at the time is advantageous, as leaving smaller interstices for air. Fermentation develops some lactic and acetic acid. In Hungary, the crop of green maize averages from 40,000 to 50,000 kilograms per hectare, or from 17.84 to 22.31 tons per acre; in Saxony, it reaches 72,000 kilograms per hectare, or 32.12 tons per acre.

By analysis of M. Moser, director of the agronomic station of Vienna, green maize shows the following elements:

	Before flowering.	In flower.
Water	85.5	76.8
Ashes	0.7	1.0
Cellulose	4.0	5.9
Fatty matter	0.8	....
Nitrogenous nutritive matter	2.0	1.9
Non-nitrogenous nutritive matter	7.0	14.4
	100.0	100.0

The alimentary value of maize has been found to be greatly enhanced by good manuring. By *ensilage*, the plant loses from 30 to 40 per cent. of weight, but this is mostly water. For horned cattle, the usual daily ration is about 30 pounds for each 1,000 pounds weight; for sheep, about 15 to 20 pounds.

DAIRY RECORD.

The season of 1875 has been one of small profits to dairymen. Factory prices of good standard cheese sank from about 15 cents at the commencement of the season to $10\frac{1}{2}$ @ $11\frac{1}{2}$ cents in the latter part, at the interior markets of New York, and at Elgin, Ill., to $9\frac{1}{2}$ @ $10\frac{1}{2}$ cents. Large stocks were reported on hand in the interior of New York at the close of the year, and much loss was anticipated by those holding summer-cheese, as the prevailing conditions of manufacture require it to be put on the market as soon as cured, on account of depreciation in quality, as well as of shrinkage.

The season of 1874 had been a prosperous one for the cheese trade, and, with the considerable increase in factories, the production of the year was swelled much beyond that of former seasons. English and American dealers who bought stocks late in the season, under the encouragement of favorable quotations, in many cases found themselves overloaded, the market turning against them, and sales dull. The poorer qualities became especially a drug, clogging the trade during a large part of the ensuing year; so that when the summer-cheese of 1875 was pushed forward there followed a very marked decline in prices, and a widely spread, though, it is believed, only a temporary, discouragement among producers.

In such a season as the past the warnings against ill-kept herds, badly managed milk, cheaply paid and inexperienced makers, and badly constructed curing-rooms are heavily emphasized in the losses falling on dairies unskilfully managed. That there are many such, is unfortunately quite evident from the multiplied complaints in agricultural journals and association reports.

While western dairy regions have the advantage over eastern in cheapness of land, stock, and feed, their grass and water are inferior. Yet, on the whole, when we compare the opportunities of the two sections for pecuniary profit, the advantages are in favor of the West. But to many western dairymen, the business of associated manufacture is new, and they have not attained to the system and economy of management more prevalent in the older dairy regions. Eagerness for immediate profits often leads them to sacrifice excellence of product, the *sine qua non* of a permanent prosperity. These faults are not limited to the West, but being more frequent than in the East, they lead to a greater inequality in the character of its cheese. This inequality puts the whole product of the region at a disadvantage in the market, and the injury falls not alone on the inferior, but reaches also the better class of producers. From like causes, western butter suffers still greater disadvantages, a fact forcibly illustrated by the controversy which has been going on between western and eastern dairy writers concerning the alleged unfairness of classifications of butter in the New York market.

SKIMMED-MILK CHEESE.

It appears by factory records that establishments situated in regions of fine grass and rich milk have made with profit partly skimmed cheese

in connection with butter. But the practice has been largely copied in less favored localities, and the skimming has often been carried to an unmistakable excess. The difficulties of the past season were considerably enhanced by large overstocks of skim-cheese of various grades. The depressed prices have given more than usual prominence to the question of manufacturing skimmed cheese, the discussion centering on the profitableness of cheese from half-skimmed milk. On this point Mr. Willard remarks that if milk be of good quality a certain amount of butter can be removed and the cheese will be as good as our current whole-milk cheese. In Somersetshire, England, where the famous Cheddar cheese is made, it is the universal practice to skim the night's milk. The Cheddar cheese sells in London market for 12 shillings and upward more per hundred-weight than the best American cheese. In a recent address before the Dairymen's Association of Crawford County, Pennsylvania, Mr. Willard says:

In my report upon English dairies, made in 1866 to the American Dairymen's Association, I called attention to the character of English milk as cleaner than ours, and I attributed the finer flavored cheese of England in a great measure to this one cause. Nothing struck me with more force than the care taken by the Cheddar dairymen of Somersetshire to get good milk. The pastures are well drained and provided with an abundance of clear running water. There are no filthy pools or mud-holes where cows are allowed to tramp and wallow in search of water. The milking-sheds are open on one side, paved with stone and cement. There is sufficient incline back of the cows so that all the filth flows into stone gutters, and, after milking, all the droppings are removed and the floor flushed with water, so that everything is clean and sweet for the next milking. The liquid excrements and washings are conducted into a tank sunk into the ground outside the milk-house, and from thence, as occasion may require, are applied to the growing crops. You will see that under this system of clean pastures, clean stables, and clean dairy-houses a better milk is obtained than with us; and thus, with proper attention to curing cheese on the shelf, the Englishman, with less skill than ourselves in cheese manufacture, is enabled to make a superior product.

GOOD MILK THE PRIME REQUISITE.

Thoroughly good milk lies at the foundation of successful dairy manufacture. The skillful cheese-maker may, with acids, suppress the germs of putrefaction in badly managed milk, but the resultant product will be injuriously affected. If the defect of quality is not soon manifest, the test of keeping develops it. Every incentive should be used to secure a correct sentiment and habit among farmers regarding the management of milk. There is great need that this subject continue to be presented, as it has so often been, at the meetings of dairy associations, and on all other available occasions. What has already been accomplished through such efforts is indicated by recent references to the fact that, at the commencement of the American dairy-factory system, bad management of milk and filthy surroundings were much more prevalent than now. The pressure of public sentiment should compel the careless producer to avoid the injury and injustice he inflicts on his fellow-contributors to the factory through his mismanagement. Reform in this, as in all other evils of magnitude, costs time, labor, and sometimes apparent hardship. When the water on the farm is in impure, stagnant pools, this must be remedied. In many cases milk-farmers must pay more attention to drainage, and to eradication of weeds, in order to fulfill their obligations to those with whom they co-operate. The evil of bad milk is the great difficulty which most besets the dairy interest, and it is the nurse of other evils also. The factory combination or dairy community which looks sharply after this matter is likely to search out and remedy defects of curing-rooms and other imperfections which prevent a full return for the labor of the farm. But neglect

of the first requisite of excellence necessarily draws after itself a degree of apathy on other points which bear on the question of profitable results.

TESTING MILK AT FACTORIES.

A new method of testing milk has been introduced in some of the New York factories. As soon as the milk reaches the factory, samples from different dairies are taken at will and placed in small cups, which are set in a water-bath and heated to a temperature of about 90° Fahrenheit. At this temperature impurities, or bad flavors arising from feeding on garlic, or from fever, diseased udder, &c., manifest themselves by their peculiar odors.

DEFECTIVE CURING-ROOMS.

At a late meeting of dairymen of Saint Lawrence County, New York, it was said by a resident well acquainted with that section that there was not a curing-room in the county that was not seriously defective in construction. Arrangements were not such as to secure a proper, equable temperature, and the cheese was exposed to such alternations of heat and cold that it was impossible to maintain the highest flavor. Curing-rooms should have double walls, on a high base of mortared stone or brick, in order to regulate the influence of the outside atmosphere.

At the ninth annual meeting of the Northwestern Dairymen's Association, Mr. N. Eldred said that, five years before, he visited a large factory, which was turning out daily thirty cheeses weighing 65 pounds each, making a total of 1,950 pounds, or nearly one ton of cheese. The curing-room was boarded up and down with very rough hemlock boards, not even battened over the cracks, some of which were large enough to allow the fingers to pass through. Yet this was in Herkimer County, New York. This, of course, was offered as an extreme case, yet as illustrating a common inattention to means of proper curing.

Prompted by observation and experience of the losses resulting from defective arrangements for curing, Mr. B. J. Johnson, a cheese-dealer at Milwaukee, Wis., built a curing-room in which he could maintain a uniform temperature summer and winter. Receiving the cheese green from the manufacturers, of the same description with that which had repeatedly proved faulty when ripened at the factory, he turned out an article of choice quality. He has done a large amount of this business.

On the point of curing summer-cheese, Mr. Willard states that experiments made in 1866 satisfied him that with properly managed curing-rooms, with walls containing air-chambers, with ventilators running through the roof, and with water at ventilating openings at the level of the floor and elsewhere, July and August cheese can be kept in flavor and cured down mellow, rich, and improved in weight. The secret lies in avoidance of undue fermentation, and in preventing too rapid evaporation during the process of curing. In the experiments referred to, the result was a rich, fine-flavored product, of good keeping quality. Some of the cheese was kept until the next season, perfect in flavor, and rich and mellow in taste. The saving in weight was about 4 per cent. This retarding of evaporation causes the retained moisture to combine with the solid constituents of the cheese, resulting in a mellow texture, and making the cheese appear to the taste more rich in butter than analysis would indicate. The principle is exemplified in the manufacture of Limburger cheese, a small cheese of two or three pounds in weight.

If cured in the ordinary manner, these cheeses would soon dry up and become almost as hard as bricks; but they are placed in a damp cellar, and set close together, so that their exhalation of moisture is retarded during the process of fermentation. The Limburger appears to be exceedingly rich in butter, and may be spread with a knife somewhat like butter. At certain stages of the curing the cheese is of a sweet, clean flavor, and resembles Stilton; but the German taste requires that the fermentation should be carried to an extent that makes the article offensive to the ordinary American palate.

Professor Arnold remarks that the temperature of the curing-room for whole-milk cheese should be 65° to 70°, Fahrenheit; for partly-skimmed cheese, 70° to 75°; for full-skims, 75° to 80°. The temperature should be kept uniform, night and day. Fluctuations of temperature injure the flavor. Take two cheeses from the same batch of curd, just alike as they come from the press, and cure one in a room properly constructed and managed and the other in a room subject to the changes of temperature, and the ripened cheeses will not be recognized as having had the same origin. The flavor of the one will be fine and clean; the other will be hard and dry, and will have a mingled taste of bitter and sour. The former will cure much more rapidly than the latter, and will show much less shrinkage at the same date. Mr. Arnold says that in factories recently built in Northern Illinois the curing-rooms are better constructed than most of the curing-rooms at the East. They have a foundation of mason-work. Studs are placed on the sills at convenient intervals for the reception of ceiling paper, which is nailed upon them, inside and outside, the strips of paper running up and down, and their edges meeting on the studs. The paper is then covered, inside and outside, with well-seasoned, matched stuff, and thus there is formed a tight air-chamber within the walls. The joists overhead are treated in the same manner.

HEATING MILK TO 130 DEGREES.

Prof. L. B. Arnold has earnestly advocated the heating of milk to 130°, Fahrenheit, whenever there is reason to believe that the milk has contracted a taint from insufficient aeration, from feeding turnips or other food liable to communicate objectionable flavor, or from some unfavorable condition of the cow. His recommendations on this point have frequently been followed with advantage. Experiments in accordance with them are referred to in the report of the Department for 1874, page 242. A recent experiment made by Mr. Arnold at Elgin, Ill., indicates the necessity of further investigation and more definite limitation as to the applicability of this remedial treatment. In the summer of 1875, at the factory of the Elgin Butter Company, he subjected 287 gallons of morning's milk to 130° of heat, and set for cream. At the end of twelve hours the milk showed signs of acidity; at the end of twenty-four hours it was sour, and at the end of thirty-six hours it was a foaming mass. Forty-eight pounds of butter were obtained, but the skimmed milk was worthless for cheese. A like quantity of the morning's milk was treated by the superintendent of the factory, Mr. Wanzer, in the old way, and set for cream at the same time with the other mess. At the end of thirty-six hours the milk was still perfectly sweet. Sixty pounds of butter were obtained, and the skimmed milk was converted into good skimmed cheese worth 7 cents per pound.

FEEDING WHILE DRY.

At a meeting of the Vermont Dairymen's Association, Mr. E. W. Stewart said that, in order to develop the milking powers of a cow to

the best advantage, she must be fed liberally while dry. There is a large draught on the system to sustain the growing calf, and it is too common to keep the cow poorly at this time, expecting to make up by feeding well when she comes in. But judging from his experience, a dollar's worth of feed before coming in returns much more, actually, than the like expenditure afterward. The food should not be heating, but enough should be given to sustain the animal in good condition, not fat. If the cow is poor when she comes in, feed then given will not return a good result in milk, for she will not digest enough to supply the wants of the system and at the same time yield a large quantity.

STEAMED FOOD.

Mr. S. M. Wells, of Weathersfield, Conn., states that his experience indicates that steaming food is profitable under the following conditions: Where there are 40 to 50 head of cattle to be fed, where good hay bears a high price, (for example, $30 per ton, which was the price that he paid for best hay in 1873,) and where there is on the farm a large amount of coarse feeding material, such as inferior hay, straw, corn-stalks, &c., by properly curing and steaming corn-stalks, as large even as the wrist, he has converted them into nourishing, profitable food. He neither cuts nor steams hay of first quality, and believes that such a procedure would not pay. Mr. Wells now steams twice a week, having a steam-chest of sufficient capacity to prepare material for several days. His method does not afford quite so good feed as more frequent steaming would furnish, but it effects a saving in labor. His engine is run at a cost of 70 cents per day. His statement applies to a herd of about 40 cattle.

GERMAN FEED RATIONS.

The following combinations are selected from quite a number presented by German experimentalists as being suggested by their investigations concerning the most nutritious and economical methods of feeding milch-cows. In adaptations to practice, attainability and price of the various materials named must be carefully considered. The rations are calculated per 1,000 pounds live weight. Daily ration, for winter, No. 1: Pounds of meadow-hay, 12; barley-straw, 11; potatoes, 15; rape-cake, 3. No. 2: Pounds of clover-hay, 10; barley-straw, 10; potatoes, 23; wheat-bran, 3. No. 3: Pounds of meadow-hay, 6; clover-hay, 8; oat-straw, 10; potatoes, 16; rape-cake, 1½. No. 4: Pounds of meadow-hay, 8; clover-hay, 8; oat-straw, 8; potatoes, 13; wheat-bran, 2. Daily ration in transition from winter feed, comparatively poor in nitrogen, to the richer green fodder of red clover. No. 1: Pounds of meadow-hay, 15; barley-straw, 9; beets, 30; rape-cake, 2¼. No. 2: Pounds of green clover, 20; barley-straw, 6½; meadow-hay, 15; beets, 20; rape-cake, 1½. No. 3: Pounds of green clover, 40; barley-straw, 6; meadow-hay, 12; beets, 15; rape-cake, 1. In this course of transition the amount of green clover is gradually increased, with a decrease in the proportion of other material, till a ration is reached composed of 100 pounds of green clover and 6 of barley-straw.

In discussing these experiments, Prof. W. O. Atwater remarks that only the very best hay is sufficiently rich in nitrogenous elements to serve as appropriate food for milch-cows. As to the use of supplementary material, that is to say, in connection with hay of inferior quality, or with hay, straw, corn-stalks, &c., Indian-meal, shorts, and mid-

dlings are of great value. Still, there is a need of food richer in nitrogen, such as beans, pease, and other leguminous plants; or of brewer's grains, malt, sprouts, or oil-cake. The value of cotton-seed cake and meal is not yet sufficiently appreciated in this country.

WINTERING COWS ON INDIAN-MEAL.

Much attention has of late been attracted to the experience of Mr. L. W. Miller of Stockton, Chautauqua County, New York, in wintering cows on an exclusive meal diet. Mr. Miller states that, sixteen years ago, being short of hay in winter, he was induced by some experiences of a gentleman of his acquaintance to commence feeding meal alone. After drying off, he placed his whole herd of 20 cows on this diet, feeding to each cow, on an average, 3 pints of dry corn-meal morning and evening. The cows were kept in comfortable, properly ventilated stables, and turned out half an hour daily for water. They were uneasy for three or four days after the commencement of this treatment, but afterward appeared unusually quiet and contented, and did not lose flesh. Sometimes a cow refused her feed, in which case a tablespoonful of dissolved copperas was administered with restorative effect. While on the meal, the animals showed little inclination for salt. In very stormy weather water was brought to the stalls. Little water was drank; the daily average per animal was estimated by Mr. Miller at five quarts. The cows were kept on meal alone for nine weeks. When they began to drop their calves in the spring, he fed in the morning a full ration of hay, and in the evening two quarts of meal only. But the cows showed a preference for meal. The calves dropped were of the usual size, and were strong and healthy. After being turned to grass the cows exhibited unusually good condition. In subsequent seasons he resorted to meal whenever he found himself short of hay, feeding the meal five to eight weeks, as the case might be, and his invariable experience was that, when turned to grass, the cows which had thus been fed did better in milk and laid on flesh more easily than when they had been fed on hay. Mr. Miller advised not to give a feed of meal in close conjunction with a feed of hay. His theory is that in such case some waste takes place during the process of assimilation. Meal from white western Indian corn is not so nutritious as that from the yellow, native corn of Western New York. The former contains only a fraction of 1 per cent. of oil, while the yellow corn contains nearly 4 per cent. There was a marked difference in the effects of the two kinds of meal on his cattle. Feeding of meal from the white corn soon caused the hair to look and feel stiff and harsh; then the skin became dry, with the appearance of scurvy; finally, some of the herd broke out with blotches along the back and sides. Though a mixture of oil-cake will prevent this difficulty, Mr. Miller prefers to use yellow meal, and avoid the necessity and expense of using oil-cake with meal from white corn. Mr. Miller further remarks:

What the effect would be if wintered continuously for consecutive years on condensed food I am not able to say, never having tested it. But looking to my own profit, as a dairyman, I propose hereafter to feed my cows when dry upon a meal diet exclusively, and also to feed more freely on this article during the spring months. My practice has been to make the change from hay to meal, and *vice versa*, suddenly, without gradation, and thus far it has been with safety; yet prudence might dictate a gradual change when returning to hay; and also care in supplying the animal with the necessary quantity of water for moistening the coarse food. If cows could be watered in their stalls, whether fed on meal or hay, in cold weather, and their stalls kept warm and clean, taking care to curry daily, there would be a saving of food. I would not wish to be understood as laying down the rule that a daily ration of three quarts of meal is

sufficient in all cases. Large cattle would require more, and small ones less. He who feeds meal exclusively should watch his animals closely, and variations should be made according to circumstances. In very cold weather the animal requires more food, no matter what its nature may be, than in warm, pleasant days. The practice of turning out animals in the cold and storms to become chilly is neither humane nor economical. Regularity in the hour of feeding is also of great importance, whatever the food. It is a law of animal life that the appetite conforms to habit, and that the digestion of food will be more perfect if taken at stated intervals. Where food of any kind is kept constantly within reach of an animal, it is tempted to eat more than nature requires, and more than can be properly digested. In feeding meal, whether alone or diluted with coarser food, it is absolutely imperative that it should be ground as fine as for family use; and if from white corn, on a meal diet exclusively, a small quantity of oil-meal or cotton-seed meal should be mixed with it.

WESTERN DAIRY STATISTICS.

The prominent interior market for dairy products in Ohio is Wellington, and in Illinois, Elgin. The shipments of cheese from Wellington during the four years, 1871–'74, averaged over 8,880,000 pounds annually. Statements of sales by the Elgin Board of Trade show 3,970,786 pounds of cheese and 225,175 pounds of butter sold in 1875, against 2,955,202 pounds of cheese and 136,426 pounds of butter in 1874. Mr. J. H. Wanzer, of Elgin, states that there are 30,000 cows within a radius of ten miles from that place, one-third of them kept in full flow of milk during the winter. Within the same limits were recently reported 32 dairy-factories. Some of these are of large size. Elgin also sends large amounts of milk to Chicago. A statement for 1872, received by the Department from the Chicago and Northwestern Railway, exhibited a shipment from that station on the road of 192,440 gallons of milk during the year.

The following particulars are from statements by prominent officials of the Ohio, Illinois, and Northwestern Dairymen's Associations and from reports of dairy boards of trade: In the winter of 1851–'52, Mr. A. Bartlett, of Geauga County, Ohio, assisted in organizing a dairymen's association in his section. But, though beneficial in its effect, it had but a brief existence. Mr. Morrow, of the Northwestern Dairymen's Association, refers to a dairymen's association formed at Elgin in 1863. The Ohio Dairymen's Association was established in 1864; the Illinois and Wisconsin Dairymen's Association, (afterward the Northwestern,) in 1867. The first cheese-factories west of New York were established about the year 1862. One was established in Ohio in the spring of that year, by Mr. Bartlett, who had visited and carefully inspected the New York factories. In the same year one was established at Elgin. The number now in Illinois is estimated at about 200. Mr. N. Eldred, a well-known cheese manufacturer of Iowa, placed the number in that State in 1874 at 40 to 50. Most of these are quite small, manufacturing annually 20,000 to 40,000 pounds; only one reaches 100,000. The census of 1870 reports, for Iowa, 14 dairy-factories.

Mr. Morrow defines the northwestern dairy region as at present including most of the northern fourth of Illinois, the southeastern part of Wisconsin, taking a little more than one-fourth of the State, the northeastern fourth of Iowa, and the southeastern fourth of Minnesota. Estimates presented by this gentleman exhibit the total cheese-product of these four States in 1874 at 25,000,000 pounds. The product of Illinois is placed at 12,000,000, Wisconsin following closely after, and Iowa and Minnesota, taken together, furnishing 9 per cent. of the total. The census of 1870 gives the cheese-product, for the previous year, of Illinois, Wisconsin, Iowa, and Minnesota, at 10,638,709 pounds. Compared with this, the above estimates indicate an increase of nearly 135 per cent.

within five years. These data of comparison, though necessarily not exact, serve to illustrate in a general way the large growth in cheese-production in the Northwest.

AGGREGATE OF PRODUCTION IN OHIO AND MICHIGAN.

Annual statistics collected by the State of Ohio show a production in 1874 of 44,335,649 pounds of butter, being 14 per cent. in excess of the exhibit for 1869, and 33,123,820 pounds of cheese, 61 per cent. in excess of the exhibit for 1869. These statistics place the product of butter and cheese in Ohio in 1869 at lower figures than those given by the United States census.

The State census of Michigan for 1874 exhibits the amount of cheese made in Michigan in 1873 at 4,101,912 pounds; of butter, 27,972,117 pounds. Lenawee County is the chief butter and cheese producing county in the State, returning for 1873 49 per cent. of the total cheese-product of the State and 6 per cent. of the butter-product. Number of butter and cheese factories in the State, 36.

DAIRYING IN MAINE.

Six years ago, dairymen's associations scarcely had existence in Maine. The American Dairymen's Association for 1869 reported one dairy-factory in the State. Now dairy-factories hold a prominent position. An abstract, furnished by Mr. G. E. Brackett, states that in 1874 there were 40 cheese-factories in operation, 36 of which made returns for that season. By assuming that the four not reporting averaged in product with the 36, the total amount of cheese turned out by the whole number is figured at 1,028,107 pounds. The largest amount made by any one factory was about 80,000 pounds, or 40 tons. Average cost of the factories, $1,911; longest time of operating any factory, 166 days; shortest time, 45 days. The nine factories in Waldo County manufactured 182,688 pounds of cheese, at a cost of 2½ cents per pound. These factories averaged for the season 110 cows per factory. Receipts per cow by patrons for the season, $21; wages of cheese-makers, $60 per month, with board; price of cheese, about 15 cents per pound; value of cows employed, $52 per head. Mr. Brackett remarks that while the cheese-factories of the State averaged only 144 cows each, their average manufacturing capacity is sufficient for the milk of 250 to 400 cows each, with only a slight increase of the present outlay.

The prices obtained for cheese by the factories in Maine have so far been higher than New York factory quotations, owing to the fact that the product is mostly taken up by the home-market. The small average return per cow is in part explained by the short duration of the factory-season, which averaged three and one-third months for the State, and slightly less than that for the factories in Waldo County.

NEW YORK FACTORY STATISTICS.

In order to a more precise determination of averages of daily production, we present the following particulars, obtained by collecting a large number of reports of dairy-factories of New York for the season of 1874. The average weight of milk per gallon is estimated at 8.598 pounds, this weight being deduced from the standard weight of distilled water and the average specific gravity of milk, namely, 1.03, as figured by Dr. Voelcker, of England, and other distinguished chemists who have largely experimented on this point.

Reports of 127 butter and cheese factories show the average length of the New York factory-season of 1874 to be 6.24 months, if estimated from the whole number of cows, and 6.44 months, if only the average number is taken into account. Average number of cows for the season per factory, 311; lowest number reported by any one factory, 55; highest number, 800. Average yield of milk per cow for the factory-season, 3,241 pounds, or 377 gallons. Excepting a few factories, which made considerable amounts of butter as well as cheese, 112 reports show an average of 331 pounds of cheese per cow, and 9.82 pounds of milk required for one pound of cured cheese. Fifty-seven factory-reports give, each, statistics of the best and of the poorest dairy for the season. These reports show an average season of 6.5 months. Average net receipt by patrons per 100 pounds of milk, $1,229, or about 2.63 cents per quart; receipts per cow, $40.33, showing 382 gallons of milk per cow. Best dairies, average net receipt per cow by patrons, $52.99, showing 501 gallons of milk per cow. Poorest dairies, average net receipt per cow, $30.63, showing 290 gallons per cow. Excess of yield per cow of the best dairies over that of the poorest dairies, 211 gallons, or about 73 per cent.

IMPORTS OF CHEESE INTO ENGLAND.

The following is a statement of imports of cheese into England from this country and from Holland during the years 1864 to 1873:

Years.	The United States.	Holland.	Years.	The United States.	Holland.
	Cwts.	*Cwts.*		*Cwts.*	*Cwts.*
1864	466, 988	336, 831	1869	487, 870	426, 913
1865	442, 913	386, 962	1870	555, 385	422, 553
1866	415, 726	426, 559	1871	731, 326	348, 148
1867	526, 740	332, 628	1872	598, 198	329, 535
1868	489, 117	329, 565	1873	790, 238	336, 654

Computed value per hundred-weight of cheese imported from United States in 1864, £2 11*s.* 11*d.;* in 1873, £2 19*s.* 6*d.;* from Holland, in 1864, £2 12*s.* 3*d.;* in 1873, £3 0*s.* 3*d.* In some years the imports from the United States exhibited a larger value per hundred-weight than those from Holland.

THE SHORT-HORN BREED OF CATTLE.

CONSIDERED WITH REFERENCE TO THE BEEF AND DAIRY INTERESTS OF THE UNITED STATES.

BY L. F. ALLEN, BUFFALO, N. Y.

What is required to advance these interests to the attainment of the most successful results? This is a broad and comprehensive question, involving not only the economic policy of the individual neat-stock breeder, grazier, and farmer, but also one of grave import to the prosperity of one of our important agricultural interests.

According to the census of 1870, the number of neat-cattle in the United States and Territories, not including Texas and New Mexico, was about 24,000,000. Adding those of Texas and New Mexico, say 4,000,000, the aggregate is about 28,000,000. This number comprises all

ages. The average age of these 24,000,000, aside from those of Texas and New Mexico, as we do not now speak of the latter, may be estimated at four years. Cows, in a considerable proportion, may reach a higher average, say seven years; steers or bullocks for slaughter, four years, although many of the best quality of them are marketed at two and a half to three years, and those of lower grades, as common natives, run from four to eight years. All the others are under maturity, and may be classed as in a state of growth, either for family and dairy cows, steers intended for fattening and slaughter, or working-oxen, whose ultimate destination after their working days are over is the shambles. The value of these neat-cattle is equal to $840,000,000. Add to this the value of 15,000 blooded cattle of different breeds, at, say, $300 per head, $4,500,000, and to this the value of the lower-priced heads of Texas and New Mexico, which number about 4,000,000, at $10 per head, $40,000,000, and the value of the neat-cattle of our country approaches $1,000,000,000.

As these animals are all consumers of other agricultural products, their chief value is derived from the skill and labor of the husbandman. A large amount of unmarketable forage contributes to their value. Hence the broad interest involved in their production and destination.

The railways now permeating almost all sections of our States, and constantly advancing not only through them but into the newer Territories, have already materially cheapened the expense of transporting neat-stock to market, and will reduce it still further as the field of cattle production is extended.

The so-called "native" neat stock of the country were first introduced from Europe more than two centuries ago, soon after the first colonial settlements were made on our sea-coasts. From them, in their mixed origin in the countries from which the colonists migrated, grew a medley of miscellaneously-bred animals, useful, in most respects, for beef, draught, and dairy purposes, but among them were none of an *improved* breed, as we understand that term. But soon after the revolutionary war a few enterprising men began to introduce improved neat-cattle into the country.

THE SHORT-HORNS.

Great Britain, chiefly England, has long been the home of the best breeds sought by American improvers. At the beginning of the present century, although it possessed the Herefords, Long-horns, and Devons, in high excellence of blood and quality, each of which had their strong advocates in the several localities where they were bred, yet the Short-horns, of Yorkshire, Durham, Northumberland, and Lincoln had so strongly established their superior qualities as beef-producers, and faith in their profitable crosses on those of other breeds, that their popularity rapidly spread among the most enterprising neat-stock breeders and graziers of the country, and that popularity they have maintained to the present time. We candidly admit that limited trials in our country show that both the Herefords and Devons possess admirable qualities, but the Short-horns have far outstripped them in popularity as the best beef-producing animals extant.

The dates of the early introduction of the Short-horns into the United States are not fully established, but as early as 1784 or 1785 an importation of "Short-horn cattle" was made into Baltimore, Md., by a Mr. Gough and a Mr. Miller, of Virginia, and taken into the valley of the South Branch of the Potomac. About the same time a few Short-horn cattle, from Yorkshire or Durham, in England, are said to have been

brought to the city of New York by a Mr. Heaton and a Mr. Hustler. Little, however, is known of their progress in breeding, and but few traces of the progeny of the latter now exist. They probably became intermixed with the common cattle of the vicinity, and their distinctive character of breed utterly lost. Some of the so-called Gough and Miller stock were taken into the "Blue-grass" region of Central Kentucky, about the year 1800, where they were assiduously bred and made a decided improvement in the cattle of that locality.

In 1815–'16 a few Short-horn cattle, from Yorkshire and Durham, were imported into the counties of Livingston and Rensselaer, New York. The latter were kept near Albany. In the year 1817, Col. Lewis Sanders, of Kentucky, imported into that State some bulls and cows from Yorkshire and Durham. From 1818 to 1828, several small importations of well-bred Short-horns were made into Boston, New York, Baltimore, by several different parties, and into Philadelphia by the late Col. John H. Powel, of the last-named city. Some of these and their progeny were taken into Kentucky and bred upon the herds resulting from the importations by Messrs. Gough and Miller (called "Patton stock," from the name of the introducer) and the Kentucky importations by Colonel Sanders, which tended largely to extend the popularity and demand for improved beef-producing cattle. In 1833, Mr. Walter Dun, then a resident of Kentucky, near Lexington, imported several Short-horns, and successfully bred and distributed them in this vicinity.

In the years 1834–1836, the "Ohio Cattle-Importing Company" imported into the Scioto Valley and contiguous counties some fifty or more well-bred Short-horn bulls and cows. In October, 1837, most of these, having been kept and bred together, were distributed among the stockholders, and some others by public sale. Encouraged by the success of this enterprise, importations of Short-horns into Kentucky, Ohio, and other States continued until about the year 1840; then our financial reverses and the low prices of meats occasioned a cessation for some years. As times improved, and the demand for meats for export and home-consumption increased, the demand for well-bred Short-horns revived, and new importations were made. With the exception of some intervals, these importations have continued until the present year.

Fully 1,200 thoroughbred Short-horn bulls and cows have been imported directly, besides a considerable number first imported into Canada, which have since found their way into the United States.

The Short-horns, so highly appreciated in England, the land of their origin, and still successfully bred there, as well as in Scotland and Ireland, are now extensively raised by the more experienced and practical neat-stock breeders and graziers of the United States. They may be considered the most profitable breed to which stock-growers can turn their attention, and the breed on which our beef-producing interests must rely.

We do not ignore some other breeds of foreign cattle, which have been introduced for sundry economical uses, and which, on the leaner soils and in many localities, may be better suited to the domestic economy of the agriculturist than Short-horns. Under some conditions, the Devons may be preferable for dairy use, also as medium-sized working-oxen, and for beef; the Hereford for working-oxen and for beef; the Ayrshire and Holsteins for dairy use—all excellent in their way. But, as beef-producers, on all good soils, the Short-horns have proved superior, and even for the dairy, when properly treated, they are inferior to none. They possess the highest requisites for flesh-production, in their anatomical structure, early maturity, and the small amount of

food required to bring them to marketable condition. From calfhood to mature growth, they are compact in form, an almost regular parallelogram in shape, broad and deep in the carcass, and in the laying-on of good flesh from the neck to the tail they are superior to any other breed. On an equal amount of food they acquire more growth in a shorter time than any others.

Let it be understood that full feed of a palatable kind is the only successful way to bring an animal of any breed to early and profitable maturity, and no animal, no matter what the breed, will maintain a constant growth and improve in size and weight without that important requisite. No animal scantily fed, either in summer or winter, can attain full growth and flesh and arrive at early maturity. That is an axiom so well demonstrated that argument is unnecessary. Upon it we base the superiority of the Short-horn over native cattle for beef, and even for veal purposes. Both in the interior and seaboard towns, the present market-value of a well-fed calf, one-half to higher fractions of Short-horn blood, at six to ten weeks old, may be estimated at $10 to $15; that of a common calf, at $5 to $8. At six to eight months old, the grazier will pay $20 to $30 for a Short-horn graded steer, while he will pay only $10 to $15 for the native. Thus the immediate profit of the Short-horn cross is determined.

Well treated and kept, both alike in the same pasture, with equal winter forage and shelter, at eighteen months old the native may acquire a weight of 600 to 800 pounds, while the Short-horn will weigh 1,000 to 1,200 pounds. At two and one-half years the native may have attained a weight of 1,000 pounds, and the Short-horn of 1,200 to 1,400 pounds. The latter will be in a profitable beef-condition, while the former will be immature and not fit for market. By adding another year to their keeping, the native arrives at perhaps 1,200 pounds and the Short-horn at 1,500 to 2,000 pounds, the former being still unripened, while the latter is at full maturity, and will sell at one or two cents per pound higher than the native. The common steer, at less than four and one-half years, is not fully ripe as a market-animal, and then, with the capital and interest invested in him, together with the risk of disease or death, and the additional forage for the extended time, he brings less money than the Short-horn a year younger. These facts, together with the fact that the Short-horn has but a small amount of bone and offal according to its weight, and gives a much larger percentage of choice meat than the native, slaughtered at whatever age, prove that the Short-horn is the most profitable for the breeder, the grazier, the feeder, and (what is quite as important) the consumer.

The above statements, drawn from long-tested and reliable sources, are made upon the basis of the most economical treatment of our cattle in bringing them to an early return of the capital, labor, and forage expended upon them. If kept a year longer, until four and one-half years of age, the short-horn will attain a weight of 2,000 to 2,500 pounds; but whether to the same percentage of profit on the feeding may be questionable. If *pushed* in keep on grain, as well as grass and other forage, they are profitably marketable for the shambles at two and one-half or three years. At those ages they may be turned off to the butcher with more advantage than if kept and fed a longer time. These, however, are matters for the graziers and farmers to determine for themselves, as their localities and opportunities may govern.

An incidental question here arises, important to the farmer who is far from the sea-board, touching the relative advantage of selling his surplus corn at a home-market, and of turning it at his farm into the

more condensed value of flesh. The cost of carrying a car-load of cattle from Chicago, Saint Louis, or other western stations, to New York, weighing, say, 10 tons, is about the same as that of a load of corn of equal weight. The present value of a car-load of first-class cattle may be estimated at 7 cents a pound in weight at New York, $1,400; while that of a car-load of corn, say, 360 bushels, at 80 cents per bushel, is only $288. Thus the farmer obtains an increased price for his corn when turned into beef, provided the cost of his cattle previous to feeding them off for market is not exorbitant. This item, however, is only touched upon for the consideration of the corn producer as well as the beef producer.

From the statements we have made regarding the superiority of Short-horns for meat-purposes, it will be seen that they are the breed most highly recommended to the attention of the American beef-producer, further reasons for which we shall proceed to state.

Short-horns are thoroughly hardy in habit and constitution, thriving in all localities where abundant grass and hay and other good winter-forage grow. They flourish in all our latitudes between 35° and 46° N., requiring no better shelter than the native cattle, and in all degrees of longitude between the Atlantic and Pacific coasts. They are equally prolific with our native or any other cattle, the cows being quite as early and constant breeders, and they attain a longevity surpassed by none. They are equally free from disease, and from their lymphatic temperament less liable to casualties by wandering from their pastures. They are disinclined to leap fences or commit depredations outside of their own inclosures.

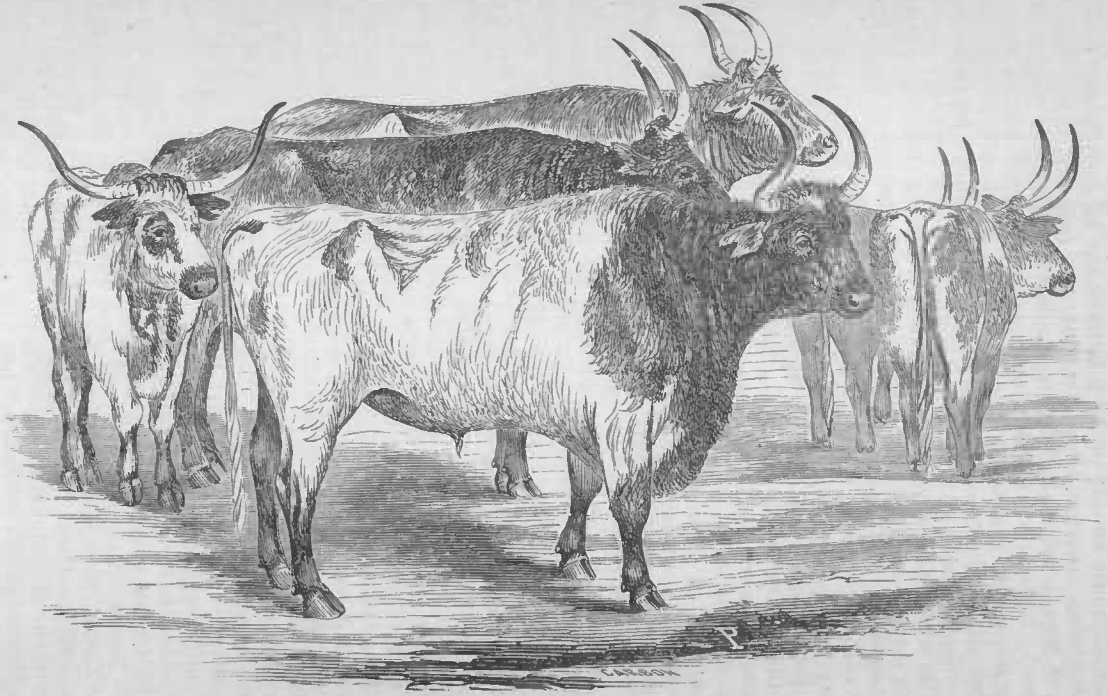
To the above considerations is to be added the important one, that stock-growers can easily, and at a comparatively cheap rate, obtain them, on account of their abundance and wide dissemination.

We do not speak of "fancy bloods" or "pedigrees," in which some of the leading breeders of thoroughbred Short-horns are prone to indulge at prices from $1,000 to $5,000, or even greater, for individual animals; and yet those prices paid for purity of blood, or individual excellence in the animal, may be justified in elevating the standard of their qualities, and in the diffusing that standard in the progeny of others. The policy of these prices and results may be left to the judgment of those who are more intimately engaged and interested in them.

A Short-horn bull of good quality and breeding is fit for service at eighteen months or two years old. At no earlier age should he be used, and at that but very sparingly. His price is, say, $150 to $300, as appearance and quality may govern in the judgments of the owner and the purchaser. Some thousands of young thoroughbred bull calves are annually produced, which, with fair keep and at moderate expense, will grow into animals fit for service at the ages we have named. In calfhood they may be purchased at much lower prices, and the additional expense of rearing them will not make the total cost exceed the $150 to $300. Properly cared for, after two years old, a bull will serve 100 cows during the breeding season, and his calves, at ten weeks old, being worth, as has been shown, $5 per head above the common, the bull will have earned much more than his cost and keeping at the end of his first year's service. Thus the *economical* question of his use is clearly solved. And, further, that same bull, barring casualties, may have a career of five to eight years' profitable service, and in the end furnish for the shambles a carcass of from 1,000 to 1,200 pounds of marketable beef.

In the above we estimate his profitable use only for breeding with common cows, or with grade cows of his own or other blood, and not

PLATE LVIII.



Group of Texas Cattle

the largely increased profit when bred with cows of his own grade, producing offspring equally valuable with himself or their dams. For ordinary service, if used up to and not beyond his full capacity, he can earn $500 during every year of a healthy life.

If an adequate supply of such bulls could be distributed throughout the neat-stock producing regions of the country, what astonishing changes would be made within a short time in our beef and cattle markets! Instead of the lean and cheap mongrel brutes which now throng our cattle-yards and slaughter-pens, we should be supplied with the best qualities of meat. Even the laboring-man's table would exult in the choicest beef, at a lower price than he now pays for poor meats after the waste and unconsumable parts which he buys are deducted. All this may be accomplished by a nice discrimination of our farmers in the selection of full-bred Short-horn bulls for breeding.

The ordinary farmer, keeping, perhaps, only a dozen cows or less, may say that he cannot afford to buy and keep such a bull; "it won't pay." But he and his neighbors, by combining, could procure the animal and make a joint use of him as readily as the larger farmer with fifty or a hundred cows. It is an entirely practicable thing for such farmers to obtain a bull which would enrich them at the rate of 50 to 100 per cent. annually in their calf product, instead of continuing the use of a worthless scrub turned loose in their pastures, and even at his maturity worth only $30 to $50 in marketable value. The question of profitably using Short-horn bulls for beef-raising we think settled beyond dispute.

Now, why is not the course which we have here recommended pursued by our ordinary farmer and neat-stock breeders? The unpalatable answer we are obliged to give is, that there is a want of enterprise and forethought among them. The farmer is usually a man of equal capacity and mental ability with those engaged in other pursuits than agriculture; but is he their equal in studying the economics and improvements constantly sought in their callings, and through which such wonderful results and progress have been achieved during the last forty years? It is lamentable to confess that farmers have failed in so doing. They have been too content to plod on in the old way of their fathers, and have kept aloof from association and the combination of effort for their own improvement, and thus stand far behind the mechanic, the artisan, and others in their productive achievements. It requires even a less laborious effort on the part of the farmer to arrive at equally successful results in his investigations and labors. But enough of the schoolmaster. Our postulate is a plain one, and he who reads may ponder and understand.

There is another highly important branch of our beef-producing interests to which we have alluded, that is, the improvement of the great herds of Texas cattle, which breed and range over the uncultivated plains of Texas, New Mexico, California, and Colorado. These are now comparatively valueless; nothing but the abundance of forage and the mildness of the climate make them worth rearing at all. The cattle, in market parlance called "Texans," are the descendants of the Spanish stock introduced into Mexico by the early Spanish settlers, soon after the year 1500. In that mild climate, with abundant forage, without artificial shelter, and with little outside care, they increased and multiplied to an indefinite extent, and found their way into all parts of that country. In Texas and New Mexico, when annexed to the United States, they existed in vast numbers, and in the census of 1870 they counted 4,000,000, about one-seventh in number of all the cattle in the States and Territories. Receiving but little care or cultivation by their

owners, they have continued in their original type of form and habit, and to-day exhibit all the characteristics of the stocks from which they descended. Among their deficiencies as economical animals, are an absence of the milking quality, beyond a scanty sustenance for a calf for three to five months after birth, and a lean, lank form, with prominent bones, long, wide-spreading horns, long in the legs, and the body gaunt in proportion, with scantiness of flesh in the most desirable parts for beef. To these may be added their half-wild natures, impatient of restraint, not kindly taking to the habits of our own civilized cattle, and their consequent less thrift when subjected to like usage with them. Yet under the stimulus of recent higher prices for beef, hundreds of thousands of them of all ages have been purchased by the cattle-drovers, and driven through the more northern Indian Territory into Kansas and Western Missouri, where they are grazed for a time, and then, started on their further routes, with more or less sales and stoppages for better feeding, have found their way in large numbers to the slaughter-houses of the western beef-packers and the seaboard markets.

A fair estimate of the average of these cattle, as they are sold in slaughter-markets, may be put at 1,000 pounds live weight, of which the *flesh* and *bone*, as sold to the consumer, may be 400 pounds, the balance being hide, offal, and a very little tallow. We speak of the average weight of these cattle. Corn-fed for some months, we have seen them up to the average of 1,200 pounds, live weight, with possibly 600 to 700 pounds of marketable meat and bone, as weighed off from the butcher's block. Yet that flesh is inferior in quality, and has little choice meat in it. "Cheap meat for poor folks," is the language of the butcher.

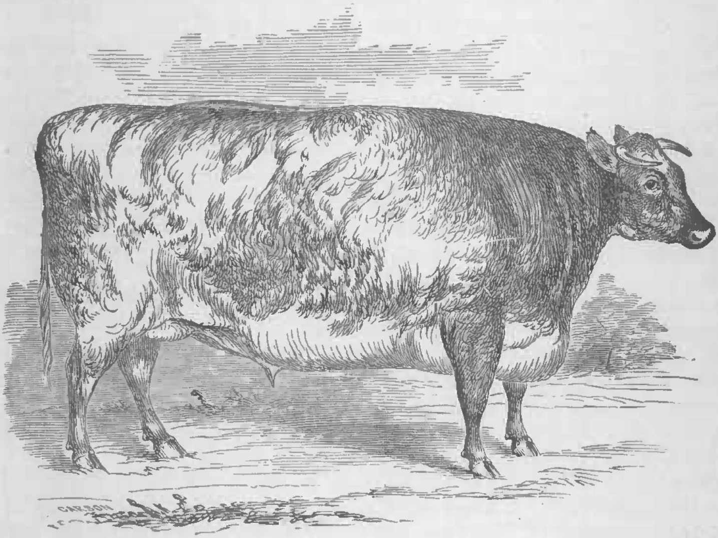
For a comparison of their appearance, in contrast with the Short-horn, the accompanying are truthful portraits.

Plate LVIII represents a herd of steers and bullocks which were sold at the Buffalo cattle-yards a few years ago, drawn by the cattle-artist, Mr. John R. Page, Sennet, Cayuga County, New York, at our request, the ages of the cattle averaging about five years. We have seen many worse and some better ones.

Plate LIX is an accurate portrait of a well-bred Short-horn bullock, either thoroughbred or high grade, at three and a half years of age. The contrast between the two breeds will be appreciated by all good judges of cattle; yet these semi-barbarians of Texas and New Mexico, by the service of Short-horn bulls upon their cows, are susceptible of wonderful improvement, and by a continuous extension of their crosses, can be worked up into well-conditioned beef animals, when taken from their wild haunts and vagrant wanderings into closer pastures and under better care, by their more vigilant breeders. Within the last few years hundreds of young Short-horn bulls have been purchased in Tennessee, Kentucky, Missouri, and Illinois, and taken to Texas, New Mexico, Colorado, and California, for the improvement of the Spanish-descended herds there, with marked profitable results in their crosses upon them. The breeders and graziers have become convinced of the absolute necessity of so doing to render the future growing of these cattle remunerative.

Intelligent experimenters say that the first cross of the Short-horn bull on the Texan cow produces stock decidedly superior to that of the cow, and at three to four years old, of double the market-value; while the value of the young half-bred cow for milk and nursing uses is double that of her wilder dam. Here, then, is a fact in favor of the future use of the Short-horn bull on the Texan cows. The result would be profit-

PLATE LIX.



TYPE OF SHORT-HORN.

able beef-animals, which would have a marked effect on the future supply of a good quality of flesh, not only for domestic consumption, but for our export demand; and even if it did not lower the price of beef in our home markets, its quality would be greatly enhanced.

OUR BEEF EXPORTATION.

The exportation of American beef to foreign markets is another subject of consideration connected with the use of Short-horn cattle. Great Britain is now a larger consumer of animal flesh than ever before. Owing to the continuous growth and extension of her manufactures and commerce, the better wages of her laboring population, and their ability to buy better meat, that country now offers a wider market for consumption than at any previous period. According to the reports of meat-supply in her larger cities, we find that great numbers of cattle from the neighboring continent are weekly brought over and consumed. These beasts are generally of inferior quality to their own, and sell at a less price, probably no better than the average of our American cattle which we consume at home. We annually pack large quantities of salted meats for exportation which find a paying market, but another commercial channel is now opened, viz, that of exporting fresh beef.

The steamships now traversing the Atlantic Ocean reach Liverpool and London from New York, Boston, or Philadelphia, on an average of twelve days' passage. In that time, in the colder seasons of the year, meat can, without refrigerators, and in the warmer months by the use of them, be transported with safety. This fact has of late been several times demonstrated, and needs neither argument nor further proof. The mode and arrangement for so doing will readily occur when the policy of transportation is settled. We consider the advantage of exporting dead meats to Europe much superior to that of live animals, although the latter has been successfully done. Aside from the increased expense for food and care, and the greater liability of casualty to the living animals during the voyage, the dressed meat costs much less in proportion to value for freighting. The question of profit in sending our fresh meats to a foreign market has not been fully settled; and, with the almost unlimited resources at our command for increasing beef-supply, through the modes indicated, we can have little doubt of ultimate success.

Our conclusion is that we must mainly rely on the Short-horns for the production of beef most profitable to breeders and graziers, as well as most palatable, cheap, and nutritious to the consumer, both in the home and foreign markets.

Let it not be objected that the supply of Short-horn bulls for crossing upon native and Texan cows is beyond the reach of the ordinary cattle-breeder. There are within the limits of the United States at least 10,000 thoroughbred Short-horn breeding-cows, which may produce 4,000 bull-calves annually, and the number of those cows is increasing from year to year. The Annual American Short-horn Herd-Book gives about 8,000 new pedigrees, chiefly of young animals, from early calfhood to two years of age, full half of which are females not before recorded, while of its more than 25,000 living pedigreed animals, two-thirds or more are breeding-cows, or to become so. To these may be added 50,000 high-grade cows not recorded in the Herd-Book, three-fourths blood and upward, which annually, from thoroughbred sires, produce 20,000 bull-calves that by proper care and feed will grow into bulls capable of largely improving the product of the native and Texan cows.

For *thoroughbreeding* the grade bulls cannot be used; yet, where the thoroughbred bulls are not easily to be obtained, the high-grade ones will answer a good purpose, and may be procured for one-half or one-third the price of thoroughbreds, say $40 to $50 each, at one year old. Certainly, then, the cost of one or more of these, capable of service for several years, cannot stand in the way of any one who seeks improvement in his stock. Thus we may consider the question of the value of the Short-horn breed of cattle as still further settled for the *improvement*, if not ultimate perfection, of American beef production.

Yet some carper or hypercritic may say: "We almost weekly read in our agricultural and stock papers of thoroughbred Short-horn bulls and cows selling at $1,000 to $5,000, and even $10,000 or more each; and how can our common farmers and cattle-breeders afford to pay such prices for beef-producing purposes?" No matter. Numerous good Short-horns for practical purposes do not sell at these prices, but cattle of choice pedigree and fashionable blood; just as a horse of high blood and mettle may sell for $5,000 or $20,000 and be no better for farm or other ordinary use than one worth $100 to $200. Yet the blood of these high-bred and fashionable bulls goes annually into hundreds of good Short-horn cows, and thereby intermixes more or less with the lower priced ones, improving their quality, and thus they become more valuable to the ordinary stock-grower for economical uses, and at no enhanced price.

That objection, therefore, has little or no force. The "fancy" Short-horn-breeder, and the prices obtained for his higher breed animals, need be no bar in the way of improvement with the less able one; on the other hand, the fancy-breeders are of great advantage to the country in maintaining a high standard of excellence in the breed; and, even if in the future such prices cannot be maintained at their maximum, those breeders will be the only losers, while the country at large will be a gainer by their enterprise.

THE SHORT-HORNS FOR DAIRY PURPOSES.

We now come to ground perhaps more debatable than that of beef-supply. Our butter and cheese production, both for home consumption and exportation, already an important agricultural industry, is annually increasing. Thirty years ago the average price of good butter was 15 to 20 cents, and of cheese, 6 to 8 cents, per pound, while within the past ten years butter has commanded 30 to 40 cents, and cheese 12 to 14 cents. There has been, perhaps, a hundred per cent. advance in those articles without much improvement in the quality of milch-cows.

Our dairy and family cows are of all kinds from the common native to Ayrshire, Devon, Holstein or Dutch, Jersey or Alderney, Short-horn, and all intermediate grades. Soil, climate, and the conditions of our wide-spread agriculture, have governed more or less, and will continue to influence the more intelligent dairymen in the selection of the cow best fitted for his purposes; but the great majority are not governed by any choice of breed. By a heedless, slip-shod practice, they demand only such as will give a fair yield of milk, and care little whether the cow requires more or less food in producing it.

The Ayrshires are a composite breed, originating about a hundred years ago by crossing Short-horn bulls on the native cows of Ayrshire, Scotland. By long use and skillful breeding, they have become valuable dairy animals there. They have been imported into the United

States in considerable numbers, and, among those who have kept and used them, are much esteemed for dairy purposes.

The Devons were introduced here in greater numbers years ago than they have been of late. Their native habitat is in the south of England. They are beautiful animals, gracefully formed, red in color, and, when cultivated for that object, have proved fair milch-cows.

The Holsteins or North Holland (Dutch) cattle were occasionally imported years ago, and have been of late, in large numbers, solely for their extraordinary lacteal production. As they are yet on probation, they afford nothing more definite than a flattering promise of future utility.

Of the Jersey, Alderney, and Guernsey, many importations have recently been made, both from their native lands in the Channel Islands, opposite the coast of France and the south of England. They are decided favorites of city and village residents on our sea-coasts, and in many places in the interior, for their moderate yields of rich milk and the choice yellow cream and butter which it makes. But as dairymen's cows, from their diminutive size and delicate constitutions, compared with our native and other breeds, and from their decided deficiency in flesh for the shambles, they are not likely to sustain a wide popularity among farmers.

In the census of 1870, we had, in the United States, excluding Texas and New Mexico, 10,240,000 milch-cows distributed on our farms, and in our villages and cities. Their average value was estimated at $30 each. In the dairy districts proper, milch-cows would average about $40, and very many choice ones, without regard to breed, not thoroughbreds of their kind, would range from $50 to $75.

In the year 1874, in New York, as reported by 127 cheese-factories, and by many of the household dairies, the milk ranged from 2,800 to 3,500 pounds per cow. Some yielded 4,500 pounds, and a few, of better selections and with better keep, made 6,000 pounds per cow. They thus average, through the cheese-making season of 270 days, from about 14 to 22 pounds per day each. This minimum and maximum product of the cheese-dairy cows in the State of New York is as high, probably, as is produced in any of the dairy States. As considerable quantities of milk were daily reserved for family use and butter, 5 per cent. more may be added to the dairy receipt as the gross quantity yielded by the cow.

Cows selected for family use in our cities and villages yield much higher than the above estimate, being better fed and treated. Many range from 12 to 20 quarts per day for ten months.

The inquiry now comes, which breed, on the whole, keeping considered, is best for the production of milk? The common or native cow consumes as much food as the Short-horn, although less in carcass by 200 to 400 pounds. This greater consumption of food, in proportion to weight, arises from the physical conformation by which food is assimilated less advantageously. The same remark applies equally to the other breeds which have been named. Therefore, by educating her milking faculties, the Short-horn may be made superior to any other.

It is thought by many who have not investigated the subject that the Short-horns, as a breed, are not good milkers. This opinion has obtained credence from the fact that a majority of Short-horn breeders have paid less attention to the milk than to flesh. The milking faculty may be diminished through neglect or other cause, while it may be cultivated to an unlimited extent by a suitable course of treatment.

In England, the Short-horns were originally considered extraordinary

milkers, and they continue so, in case their milking qualities have been cultivated, so that 30 and even 35 quarts have often been registered as their daily production, and 12 to 16 pounds of butter per week in the height of the season, on grass alone. Instances of equal quantities per cow are recorded in notes to their pedigree during the last twenty-five years in the American Herd-Book, and the same cows, after years of service in the dairy, have given a carcass of 800 to 1,000 pounds of excellent meat to the butcher. Certainly we have no other breed of cows which have done so much.

On this subject we append a note from the December number, for 1875, of Bailey's Short-horn Reporter, by Mr. Harris Lewis, a leading dairyman in Herkimer County, New York:

There is no way known to me by which our dairymen can so easily and certainly improve the milking qualities of our native herds as by using a thoroughbred Short-horn bull, and raising the heifer calves from the best milkers. The bull should be from a good milking family of Short-horns, of course, to insure the best results.

I commenced this practice several years ago, and the result has been so favorable that I am now running into the thoroughbreds for my dairy. I started with the intention, however, of grading up to ⅞ or 15/16 Short-horn blood, and then crossing with the Ayrshire. But this notion I have abandoned altogether.

We have now eleven thoroughbred Short-horn females, and, with ordinary success, will soon have an entire dairy of them. You will see that I am after milk, not beauty altogether; yet I do like to see a good-looking cow. The first cross of the native cow with a Short-horn usually produces better results than subsequent crosses, but this rule may not hold good if the bulls used for the second or third crosses are of superior milking stock to the one used at first.

The very best milker I have ever owned or ever seen, with the exception of old Creamer, was got by a Short-horn bull out of a native cow, and I find that our Herkimer County dairymen, with all their prejudices against the Short-horns as milkers, will first select, from droves of cows brought in for sale, the Short-horn grades, and pay better prices for them than for the full-blooded natives. I must confess that our breeders of Short-horns have bred all the milk out of them they could, preferring beauty to utility, and have made it pay the best; but this will not always continue. I would add, in conclusion, that a cow of any breed must be educated as a milker while a calf.

In concluding, we must say that, with care in selecting Short-horn bulls descended from good milking dams, and using them to good milking cows, whether of native or other breeds, the value per head of our American cows may be increased from $30 up to $50, $60, or more, and their annual products increased in a corresponding ratio.

HOG-CHOLERA—INTESTINAL FEVER IN SWINE.

By Prof. James Law, Ithaca, N. Y.

Synonyms.—Typhoid Fever, Enteric Fever, Typhus, Carbuncular Fever, Carbuncular Gastro-Enteritis, Carbuncular Typhus, Pig Distemper, Blue Sickness, Blue Disease, Purples, Red Soldier, Anthrax Fever, Scarlatina, Measles, Diphtheria, Erysipelas.

Definition.—A specific, contagious fever of swine, characterized by congestion, exudation, ecchymosis, and ulceration of the mucous membrane of the intestines, and to a less extent of the stomach; by general heat and redness of the skin, effaceable by pressure; by small red spots, complicated or not by elevations and blisters; by black spots and patches of extravasated blood on the integument, the snout, nose, eyes, mouth, and all other visible mucous membranes, and on internal organs, ineffaceable by pressure and tending to sloughing;

usually, by liquid and fetid diarrhœa; and by a very high and early mortality.

The malady has been long known to pig-raisers and pork-factors in the Old World and the New, but in veterinary works it has been mistakenly placed in the list of malignant anthrax affections, to which many of its lesions bear a striking resemblance. Two English works, published within the last year, repeat this time-honored fallacy. To malignant anthrax it is allied by the altered condition of the blood, by the solution of the blood-globules, by the imperfect coagulation of the blood in many cases, by the occasional enlargement and congestion of the spleen, by the extravasation of the blood out of the vessels (petecchiæ) into the skin, mucous membranes, and internal organs, and by the dusky hue of the eye, nose, &c. That it is essentially distinct is shown by the fact that its virus, so frightfully contagious and fatal to pigs, is not communicable to any other domestic animal. The contagion of malignant anthrax, on the other hand, is deadly to all domestic animals, and even to man himself.

The common American designation of hog-cholera has only the diarrhœa to support it, and, as we see outbreaks in which this feature is mainly remarkable for its absence, the name comes to be an absolute misnomer. In many cases a gelatiniform exudation takes place on the affected surface of the mucous membrane of the intestines, windpipe, or bronchia, and the disease has accordingly been named diphtheria. But as such an exudation is by no means constant, a name founded on this peculiarity would have no actual foundation in a large proportion of cases. Again, the exudation (see *post mortem* No. 1) is mainly composed of cells and granules, with less of the fibrinous matrix than is usual in diphtheria. Lastly, the intestinal fever of swine is most virulently contagious, whereas diphtheria is very slightly, if at all, infectious, and is confined rather to certain insalubrious localities or buildings.

From scarlatina and measles it is sufficiently distinguished by the constancy of the intestinal lesions, though it resembles both in its cutaneous rash. With erysipelas it has no real connection, the one common feature, the redness of the skin, being due to a condition altogether different in nature, progress, and results.

The constancy of the congestion, specific deposit, and ulceration in the intestines in the fever of swine, characterize it as perfectly as do the same lesions in typhoid fever in man. It further agrees with typhoid fever in having a higher evening than morning temperature and a rose-colored eruption on the skin. To this disease, indeed, it bears a closer resemblance than to any other disorder of man or beast, so that Dr. Budd and others with much plausibility call it the typhoid fever of pigs. But in spite of the similarity of the specific deposits and ulcerations on the intestines, those of the pig show less tendency to attack the agminated glands (Peyer's patches) and the solitary glands than is the case in man. They appear on all parts of the mucous membrane of the large and small intestines, yet the agminated and solitary glands rarely escape entirely, and sometimes they alone are the seats of ulceration and morbid deposit. The skin eruption, too, in the pig-fever is often distinctly raised, and even vesicular, whereas that of typhoid fever is a simple rash, and, like a blush, may be completely though temporarily effaced by pressure. Finally, the contagion is incomparably more virulent and tenacious of life than that of typhoid fever, and the mortality is greater and occurs earlier in the disease. On the whole, we must look on this affection of pigs as a disease *sui generis*, having close affinities with the typhoid fever of man, yet essentially

distinct, and hence the term intestinal fever of swine is more applicable, as at once expressing its nature and avoiding confounding it with other and distinct affections.

Incubation.—The period of incubation has not been definitely settled. My experience in Scotland in 1864 would have led me to set it down at from seven to fourteen days. The infected pigs were four days on the journey from the English market by rail and seven days on the farm before the disease manifested itself. Again, the home-bred swine were sound until four weeks after the strange hogs came on the farm and three weeks after the latter were generally sick. Pigs, though farrowed by sick dams, did not show any sign of the disease for about a week, although nearly all eventually died.

In Dr. Budd's cases, in April, 1865, the first symptoms of illness were shown four or five days after the pigs were brought from Bristol market, where they may or may not have been infected.

Dr. Sutton's experiments, made at Aurora, Ind., in September, October, and November, 1848, deserve repetition in this connection. 1st. Six hogs, after contact with diseased animals, were placed in a sound pen, and sickened on the fourteenth day. 2d. Of ninety similarly exposed and then put in a sound yard, some sickened on the thirteenth day. 3d. One hundred, similarly exposed, contracted the disease on the thirteenth day. 4th. One hundred and thirty, placed in a yard adjoining one occupied by diseased hogs, became ill on the thirteenth day. 5th. Four young and healthy pigs, placed in a pen occupied four days previously by diseased hogs, sickened on the fourteenth day. 6th. Five healthy hogs, inoculated with the blood from the inflamed tissues of diseased swine, were unwell on the fourteenth day.

Further experiments were made by Professor Axe, of London, in April, May, June, and July, 1875. 1st. Two healthy pigs were (in April) placed for forty-eight hours in the same house with a diseased one, contact being carefully avoided. One was dull and off its food on the sixth day, and the other on the eighth. 2d. On May 15 a pig was inoculated with the liquid cutaneous exudation, which had been kept on dry ivory points for twenty-six days. On the fifth day there was slight dullness and heat of skin, and on the sixth the malady was well developed. 3d. On June 10 another pig was inoculated with the cutaneous exudation of the last, the operation being performed by another party and the pig kept apart to avoid all risk of indirect contagion. On the fifth day temporary redness was noticed on four teats, and on the sixth the symptoms were fully developed. 4th. Another pig broke into the pen occupied by the last-named subject and was left there for six days, when it was taken out seriously ill. In the hot summers of Illinois instances are met with in which symptoms of the disease are shown in a previously healthy herd under three days after the wind has blown from the direction of a sick lot half a mile distant. In analyzing this apparently somewhat discordant evidence, we must bear in mind that the period during which a poison will remain latent in the system will vary according to the amount taken in, the excited or febrile condition of the subject, and the mode of introduction into the system. Thus an excess of any poison, animal or vegetable, will usually show its effects with remarkable rapidity. A feverish state of the system, whether induced by intense heat, passion, or disease, will rouse the poison into unusually early activity. Lastly, poisons that are inoculated usually act sooner than those introduced into the system by other channels. These considerations will serve to reconcile the prolonged latency of the poison in Dr. Sutton's cases, observed in cold weather, as compared with Dr. Budd's, Professor

Axe's, and my own in the English summer, and of these in their turn with the prompt development of the malady in the semi-tropical summer of Illinois.

Symptoms.—The earliest symptoms are slight dullness, with, sometimes, wrinkling of the skin of the face as if from headache; shivering or chilliness, and a desire to hide under the litter, are not uncommon. Some loathing of food, intense thirst, elevation of the temperature of the rectum to 104° Fahrenheit, and increased heat and redness of the skin are usually the first observed symptoms, and occur one or two days later than premonitory signs above mentioned. The increased heat of the skin is especially noticeable inside the elbow and thigh and along the belly. By the second day of illness, the whole surface feels hot, and in white pigs is suffused with a red blush, which may pass successively through the shades of purple and violet. It is usually more or less mottled at particular points, and a specific eruption appears as rose-colored spots of from one to three lines in diameter, sometimes slightly raised so as to be perceptible to the touch, and either pointed or more frequently rounded. The redness fades under the pressure of the finger, but only to re-appear immediately. The eruption is usually abundant on the breast, belly, and haunch, the inner side of the forearm and thighs, and the back of the ears. It stays out for two or three days, and may be followed by one, two, or more successive crops of the same kind. The cuticle is sometimes raised in minute blisters, a feature which distinguishes this from the rash of typhoid fever, and the liquid of such blisters inoculated on other pigs communicates the disease. In addition to the rash, and simultaneously with it, or soon after, there appear on the skin numerous spots of a dark red or black color, varying in size from a line to an inch in diameter, on the color of which pressure has no effect. These are due to the extravasation of blood, or of its coloring matter from the blood-vessels into the tissues, and they dry up into thin scabs or sloughs if the animal survives. Similar petecchial spots appear on the muzzle, in the nose, and on the eyes, and in some instances they are confined to these parts. The tongue is covered by a brownish fur.

From the first, the animal is sore to the touch, but as the disease develops the handling of the animal is especially painful, and causes grunting and screaming. The pig lies on its belly, and, if compelled to rise and walk, moves stiffly, feebly, unsteadily, and with plaintive grunting. This weakness and prostration rapidly increases, and often ends in utter inability to rise or to support the body on the hind limbs. A watery discharge from the nose, followed by a white muco-purulent flow, is not uncommon. A hard, barking cough is frequently present from the first, and continues to the last. Sickness and vomiting may be present, but are far from constant. The bowels are often confined at first, and in certain cases, and even in nearly all the victims of particular outbreaks, may remain so throughout, nothing whatever being passed, or only a few small black pellets covered by a film of mucus. These cases are quickly fatal. More frequently, however, they become loose by the second or third day, and diarrhœa increases at an alarming rate. The passages are first bilious, and of a light or brownish yellow when not colored by ashes, charcoal, or the nature of the food. But soon they assume the darker shades of green and red, or become quite black and intolerably offensive. In such cases the elements of blood, inspissated lymph, and membranous *pellicles*, sloughed off from the ulcerated surfaces, are usually to be found in them.

The diarrhœa becomes more profuse, watery, and fetid; the pulse sinks so as to become almost imperceptible; the cough becomes more frequent,

painful, and exhausting; the breathing is more hurried and labored; and the weakness increases until the patient can no longer rise on his hind limbs. At this period the petecchiæ become far more abundant. Before death the animal is often sunk in complete stupor, with, it may be, muscular jerking or trembling, or sudden starts into the sitting posture, and loud screams. In the last stages, involuntary motions of the bowels are common.

Exceptionally swellings appear on the flank, with extreme lameness, and extensive sloughs of the skin of the ears or other parts. Palpitations of the heart also occasionally occur as precursors, attendants, or sequels of disease. If the disease should take a favorable turn, slight causes may make an early and perfect recovery, a complete convalescence being established in three or four weeks. A considerable proportion of the survivors, however, linger on in an unthrifty condition for months, evidently suffering from the persistent ulceration of the intestines, or infiltration of the lungs. The mortality often reaches 80 or 90 per cent. of all swine exposed, and in case of a certain number of the survivors recovery brings no profit to the owner.

Post-mortem appearances.—The blue color of the skin becomes deeper and more universal a few hours after death. The fat beneath the skin is colored more or less deeply in points corresponding to the discoloration of the integument. The snout is usually of a deep blue, with ineffaceable black spots, (petecchiæ.) The membrane lining the eyelid, and to a less extent the skin, present similar black spots of extravasation.

The most constant changes are in the mucous membrane lining the alimentary canal, and especially that of the terminal portion of the small intestine (ileum) and the commencement of the large, (cæcum, colon.) The tongue is furred, but deep red, and even eroded, at its base, and the pharynx and adjacent parts usually studded with petecchiæ. The cavity of the abdomen generally contains a few ounces of reddish serum, which coagulates on being heated. The stomach may show no more than a pink blush, but more commonly it is of a deep red, from congestion, especially toward the pylorus, and its mucous membrane is often black throughout from the close aggregation of petecchiæ. The small intestines are usually extensively congested, and of a deep red, in many cases approaching to black, as examined externally. Their mucous membrane in such parts is equally high-colored, studded with petecchiæ, and in some cases lined by a firm, semi-fibrinous exudation. A more constant condition is the presence of minute sloughs or erosions in the seat of petecchiæ, and of equally small elevations, due to excessive cell-growth, beneath the epithelium. These commonly have a whitish center, with a yellowish or red border. Such is the appearance in cases that prove fatal within two or three days. In those that have survived longer, extensive ulcers appear, of an inch and upward in diameter, evidently the sequel of the petecchiæ, and especially of the eruption.

These ulcers are often covered by black scabs, or sloughs, have irregular projecting margins, and a variously colored center, consisting of cells in process of disintegration. They are sometimes situated on Peyer's patches, but show no very marked preference for those over other portions of the mucous membrane. The large intestines present a similar varying vascularity, discoloration, petecchiæ, deposit, softening, and ulceration. The changes are especially marked in the cæcum and colon and in the rectum, close to the anus. The solitary glands are often large and open, but the ulcers show no particular preference for the points occupied by them. Extensive extravasations of blood into the coats of the bowels and among their contents are not infrequent, and in

certain exceptional and advanced cases the peritoneum is inflamed, and false membranes bind the bowels together or to other organs, or to the walls of the abdomen.

In the windpipe and air-passages within the lungs, the mucous membrane is usually mottled with black petecchiæ, or covered by a viscid mucous exudation. The anterior lobes of the lungs are often solidified by exudation, but remain bright red, tough, and elastic, (splenisation.) Limited hepatization is also exceptionally met with, and even false membranes on the pleura or pericardium.

Petecchiæ are common over the various internal organs—on the lungs, pleuræ, heart, pericardium, diaphragm, peritoneum, liver, pancreas, kidneys, and bladder. The spleen is large and dark, as is usual in connection with blood-poisons. Both sides of the heart contain clots of blood, extending from the auricles and ventricles into the great vessels. In the worst cases, the clot is black, soft, and somewhat diffluent; exceptionally it is firm, and shows a distinct buffy coat. The blood-globules, as seen under the microscope, are more or less puckered or crenated at their edge, and mixed with an excess of granular *débris*, and even in some instances spores of a fungus, (*micrococcus.*)

As illustrating the various lesions in different cases, I append from my notes of *post-mortem* examinations two that occurred with two years' interval, and near Edinburgh and London, respectively:

I.

No. 4.—A three months' old, white Yorkshire pig, in excellent condition. Examined a few hours after death, being still quite warm, *rigor mortis* had set in strongly. Along the whole lower surface of the body, from the mouth to the tail, are spots of dark red or purple. On the right side of the head and left side of the chest, the spots run into each other, so much that they seem to form a single continuous blush. On the back, the spots are smaller, and less numerous. There are no spots nor petecchiæ on the snout, but a glairy bloody fluid runs from the right nostril.

The membrane lining the eyelid is congested, having a dark hue, approaching purple, and a portion of the mucous membrane of the rectum, exposed by the relaxation of the sphincter, presents the same appearance. Dark red spots and petecchiæ exist about the vulva. Under the belly is a subcutaneous layer of fat of about an inch thick, and beneath the purple spots on the skin this is discolored by blood throughout the entire thickness.

The abdominal cavity contains six ounces of a dark bloody fluid. The intestines have a deep florid hue externally. The stomach and the greater part of the rectum are pale and without any lesion of the mucous membrane. Close to the anus this membrane is congested. The stomach contains about two pounds of food, (boiled potatoes, corn, &c.) The small intestines have their mucous membrane thickened, soft, friable, and very red, the shades being lighter or deeper at different points. It presents at intervals spots of a much darker hue, approaching purple, and respectively from one to two lines in diameter. The large Peyer's patch on the ileum seems hypertrophied and of a deep red, especially close to the ileo-cæcal valve, where it also shows small ulcers. The large intestines have their mucous membrane of a very bright red, soft, friable, and presenting at intervals small ulcers of about a line in diameter, and corresponding apparently to the solitary glands. Some of these ulcers are of a deep red, and appear on the peritoneal coat as dark

spots; others are of a dirty white in the center, with raised red edges, and are not so marked on the peritoneal surface. A small nodule felt through the outer coats is characteristic of both. The contents of the large intestines consist of dark semi-liquid fæces, with a great amount of ashes.

The liver is variable in color and very friable. Though still warm, it presents small bubbles of gas at intervals under its capsule and throughout its substances. The gall-bladder is half full of a very light-colored yellow bile. The pancreas seems healthy. The kidneys, bladder, and uterus are normal.

The pleuræ and lungs appear healthy, excepting a portion of the anterior lobe of the left lung, which is in a state of splenisation. The bronchia contain bloody froth, especially in the left lung, and those of the solidified portion contain a white solid substance, completely filling them, and appearing to the naked eye like a fibrinous clot, while under the microscope it is found to be mainly composed of small globules about the size of blood-cells. It is disintegrated and partly dissolved in a strong solution of potassa. The mucous membrane of the larynx and trachea is congested, and the tube filled with a white frothy mucus of an exceedingly tenacious consistency.

II.

No. 2.—Three months' old female pig, large of its age. Dead twelve hours. *Rigor mortis* well marked. Skin almost universally of a livid hue, but purple along the abdomen. Back, white. Profuse eruption over the body, but specially abundant on the abdomen. The smallest, and evidently the most recent specimens of the eruption, are individually about a line in diameter, deep purple, and covered by a delicate, slaty-looking skin. The larger spots have a dark, hard, dead center, which appears to spread gradually to the whole of the patch; some appear as a large black scab of ½ to 1 inch in diameter.

Abdomen contains six ounces of serum, which forms a solid coagulum on being heated. False membranes bind the large intestines to the lower wall of the belly, also the two horns of the uterus together and to the bladder, and both to the walls of the pelvis. The large intestines are the seat of an exudation half an inch thick, from which a straw-colored fluid escapes on section. The stomach is considerably discolored on its great curvature externally, as if from extravasated blood. The mucous membrane of the stomach presents numerous petecchiæ and ramified redness along the great curvature. The small intestines show slight branching redness on part of the ileum.

Large intestines.—Cæcum has its mucous membrane abnormally vascular, with abundant petecchiæ, and ulcers of considerable standing; these appear as white, raised masses, and have no manifest connection with the solitary glands. The blind-gut contains numerous ascarides. The mucous membrane of the colon repeats that of the cæcum, but at one point beneath its serous coat is a blood-clot measuring one inch by half an inch, and a quarter of an inch thick.

The liver is healthy. The diaphragm has abundance of petecchiæ on its posterior surface, especially on the cordiform portion, and apparently leading in radiating lines from the center. Beyond the presence of petecchiæ the organs of the chest seem to be little affected.

Causes.—Contagion is a main cause of this disease. The introduction of diseased pigs into healthy herds; the placing of healthy pigs in pens, cars, steamboats, markets, &c., where diseased swine are then or have

formerly been exposed; a fresh breeze from the direction of a diseased herd, though half a mile distant; the passage of men or quadrupeds or birds from the diseased to the healthy; the use of food, litter, or water that has been in near proximity to the affected animals, have each served to transmit the fever. The virus appears to be concentrated in the bowel-discharges and liquids of the eruption, but doubtless exists in all the liquids and tissues of the body, and is given off into the air from the skin and exposed mucous membranes. Pigs are often born sick, and die in twenty-four hours. The feeding-troughs and water, contaminated by the filthy feet and snouts, are particularly liable to convey the disease.

The malady prevails at all periods of the year, but it has opportuities for the widest diffusion in dry seasons and countries, where the virulent matter may be dried up and preserved unchanged for an indefinite period, and in this state may be carried by winds, and otherwise. Wet weather contributes to the decomposition and destruction of this, as of many other animal poisons, but cannot influence its propagation by the direct contact of healthy with diseased animals, nor affect its preservation inside dry buildings.

Unwholesome conditions of life contribute largely to its diffusion, if not to its development *de novo*. The malady frequently appears in pigs that have been carried several days in succession, in crowded boats or cars, among the accumulated filth of their own bodies and those of their predecessors, and subject to compulsory abstinence from food and water. Again, it will occur in fat hogs that have been driven a number of miles under a hot sun and then cooped up in a filthy, close, ill-ventilated pen, subjected to the reeking fumes of their own bodies and of long-accumulated nastiness. Many think that dry-corn feeding and overcrowding on filthy manure heaps are largely productive of the disease. But it is too much to assume that the poison is developed *de novo* in such conditions. Similar unwholesome influences favor the development of all contagious diseases, by loading the blood with effete and deleterious organic matter, and bringing about a feverish and susceptible state of the system. But, on the other hand, such abuse and maltreatment fail, in very many cases, to induce the affection, so that we are left in doubt, in regard to those instances in which it appears, as to whether the virus was not hidden away in the buildings, cars, &c., and roused into activity by the presence of a fertile field for its growth in the bodies of the pigs, the blood of which was loaded with organic elements in process of decomposition. The important point is this: We know this as a contagious affection, to the propagation of which all probable insalubrious conditions contribute. So soon as we concentrate our attention on this point, we have the key to its prevention, if not to its entire extinction. But, while admitting the influence of overcrowding, filth, starvation, and suffering in predisposing to this disease, it ought to be added that the very highest mortality is often reached among pigs kept in the best hygienic conditions, but among which the virus has been accidentally introduced. Again, some hogs, and even families, appear to be insusceptible, and resist the poison which is carrying off all around them. But similar instances of immunity are met with in all contagious affections.

Treatment.—In a fatal contagious disease like that under consideration it is rarely good policy to subject to treatment. The enormous increase of the poison in the bodies of the sick, and the extreme danger of its diffusion through the air, as well as on the feed of men and animals, render the preservation of the victims eminently unsafe and unprofitable.

Yet in the case of very valuable animals, and where seclusion, disinfection, and careful nursing can be secured, it may be resorted to.

A dry, airy, well-littered building may be provided, abundantly sprinkled with a solution of carbolic acid or chloride of lime. Rugs steeped in a solution of one or other of these agents may be hung up at intervals, and sulphurous acid set free by burning a pinch or two of sulphur three or four times a day. The dung should be saturated or thickly sprinkled with finely-powdered copperas. Any drains will require disinfection in the same way. If the sick animals are kept in the open air, the ground must be freely sprinkled with disinfectants, above all where the dung has been deposited.

The diet should be well-boiled gruel, of barley, rye, or Graham flour; or, if fever runs high, and the temperature is raised by such food, corn-starch, made with boiling water or milk, may be substituted. Fresh, cool water should be freely supplied, either pure or slightly acidulated with sulphuric acid.

During the early stages, while constipation exists, the bowels may be gently opened by castor oil (2 ounces for a good six months' pig) or rhubarb, (1 drachm,) aided by injections of warm water. The heat of the skin must be counteracted by sponging with cool or tepid water, as may seem most agreeable to the patient. As the laxative operates, 20 grains of nitrate of potash and 10 grains of bisulphite of soda may be given twice a day in the drinking water. Charcoal may also be given to absorb and neutralize the deleterious products in the bowels. Or the niter may be replaced by any other neutral salt, and the bisulphite by another antiseptic agent. If the patient survives the first few days, and gives indications of ulceration, by tender abdomen, diarrhœa, and the passage by the bowels of membranous sloughs, oil of turpentine, in doses of 15 or 20 drops, may be given, shaken up in milk or beaten in an egg; or this may be replaced by similar doses of creosote or carbolic acid, or 3 to 5 grain doses of nitrate of silver. It may be necessary to give opium to check excessive purging, or stimulants to sustain the failing strength and very prostrate condition. Infiltrations and inflammations of the lungs and bowels may demand applications of mustard and turpentine to the chest or abdomen. In short, any complication must be combated as it appears, and the soundest judgment will be wanted throughout to adapt the treatment to the various indications. Each case will demand as close attention and as careful an adaptation of remedial measures to its different stages and phases as would a case of typhoid fever in man. In case of recovery, a course of tonics (gentian ½ drachm, sulphate of iron 10 grains daily) will often be beneficial, and the return to ordinary feeding should be brought about by slow degrees.

Prevention.—A successful system of prevention can only be instituted when we duly appreciate the fact that almost all cases of this intestinal fever are due to contagion. And this is precisely what our hog-breeders fail to realize. No man in his senses will affect to deny that the disease is contagious, but the natural tendency is to seek for other causes in the great majority of cases. As in the case of all contagious affections that have attained a wide prevalence, this presents a number of outbreaks which cannot be traced to contagion from any diseased stock, and these are at once assumed to be spontaneous, and the cause of the disease is sought in the peculiar treatment of the herd, and future prevention is attempted by the avoidance of these peculiarities. In illustration, I may quote from a letter of Mr. I. F. Hatch, an intelligent Illinois farmer, and former student of Cornell University:

In former years hog-cholera has been local with us except when it first appeared, some ten or twelve years since. Then, as now, it was general, and swept everything. But since then it has been confined to a few farms or localities. Sometimes it appeared on a single farm, or perhaps on several farms, one, two, or three miles apart, all others escaping. I have a neighbor who has had it every second year since its first appearance, losing more or less hogs each time, but his is the only case of which I have been informed where it has been so regular and often.

This irregularity and local appearance deluded us into the belief that we were preventing the disease by extra care and attention, and that salt, sulphur, and ashes were a preventive; but we have been effectually undeceived this time, for hogs that had been doctored thus fared no better than those that had not.

There is one man here whose hogs have escaped the disease entirely, and he has fed for a number of years once a week or once in two weeks corn boiled in the ear with ashes—*lyed corn*, as they call it—putting a peck of wood-ashes into a forty-gallon kettle. He tells me he has had no cholera since he adopted this plan, and his hogs are certainly good subjects for cholera, poor, half-fed, and sleeping in a pile under the barn. He says others have tried this plan, and successfully warded off the disease.

He goes on to quote instances of alleged prevention by feeding house-slops without corn, and by giving once a week a feed of the boiled jowls and waste parts of the pigs killed the year previous, and adds:

Generally, diseased hogs run, sleep, and eat with the others, it being the general opinion that *they'll all have it any way, so no matter*. I am of a different opinion. A few change the yards and sleeping-places, but generally they stay in the same places throughout the disease. No attention is paid to disinfection.

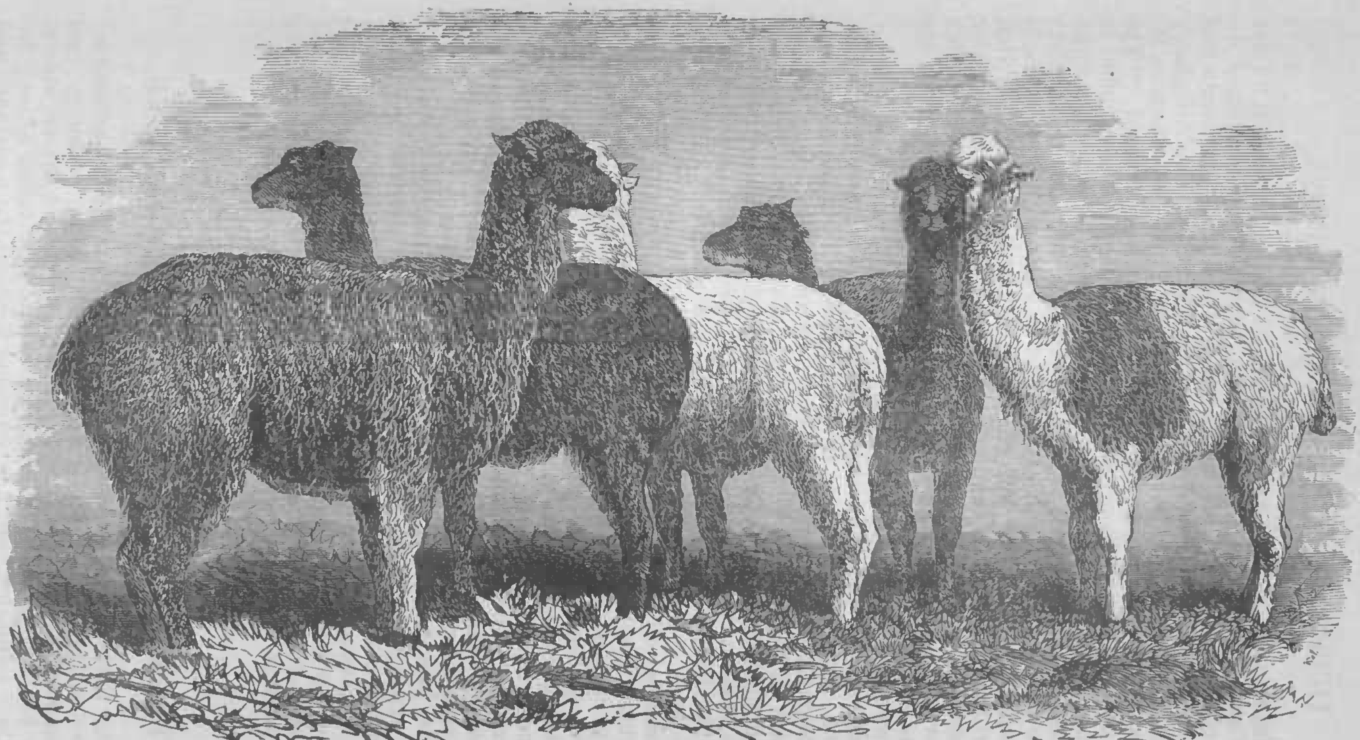
These alleged preventives are doubtless somewhat beneficial by maintaining a free action of the bowels and kidneys, and favoring the elimination of the poison, as does diarrhœa in the milder cases of the disease. But there need be as little doubt that, like the salt, sulphur, and ashes, they would all fail in the presence of a strong dose of the poison. Meanwhile, they are made to serve an evil purpose in diverting attention from the one effectual means of restricting the disease, the extinction of the poison. It must be fully recognized that neither contact nor proximity is necessary to contagion. The poison may be carried a certain distance on a stream of water without losing its vitality. It may be blown a long way by a favorable wind, when dried up, on light objects. It may be carried on the boots, hands, &c., of men (dealers) passing from farm to farm and from district to district. Horses, cattle, sheep, dogs, fowls, pigeons, and wild animals of all kinds are liable to carry the virus on their feet and limbs, and to deal out death to the pigs at places widely separated from each other. It is, therefore, quite impossible to trace all new outbreaks to contagion. But to attribute them to spontaneous evolution of the disease is to beg the whole question. It can be freely conceded that a certain number of cases probably originate spontaneously every year; but these are few and far between as compared with the enormous mortality caused by contagion. It can be equally conceded that certain seasons are far more favorable to the propagation and virulence of the disease than others, yet even in these the great majority of cases are infectious. It can be admitted even that a wholesome laxative diet is to some extent protective, as well as comfortable dwellings, and antiseptic agents, like copperas, bisulphite of soda, charcoal, or carbolic acid. But all such protectives are comparatively limited in their operation, and, though they seem to have saved a few isolated herds, will fail disastrously if generally relied on. The epizootic influence, too, though apparently all-powerful in localities where the poison has already penetrated, fails to produce the disease in the neighboring States not previously infected. We cannot give too much attention to secure the best sanitary conditions of life for the hogs, but if we allow a few of these so to engross our attention that our eyes are blinded to the most important of all—the prevention of contagion—

we shall only spread the poison and increase the destruction of our herds. On the other hand, the highest success must attend such measures as will stop the production of the poison and destroy and render innocuous what is already in existence.

Diseased pigs must be removed from the healthy, killed and buried. A thorough disinfection of all buildings, yards, and manure must be made. Chloride of lime or zinc, sulphate of iron, or carbolic acid may be used for all solids—floors, troughs, walls, &c.—and for drains; and sulphurous acid or chlorine for the atmosphere. The sulphurous acid may be produced by burning sulphur, and the chlorine by adding oil of vitriol to common salt and a little black oxide of manganese. The surviving pigs must be carefully watched for the first signs ot illness. Any unusual sluggishness, stiffness, or inappetence, or any disposition to leave the herd, demands a careful examination; and if there is heat or shivering, and, above all, if the thermometer introduced into the rectum indicates a temperature above 103° Fahrenheit, the animal should be at once separated from the herd, and destroyed as soon as unequivocal symptoms of the malady are shown. Care should be take to avoid the possibility of contamination by water which has passed infected hog-pens or fields. If the malady exists within a wide radius, the visits of dealers and others must be absolutely forbidden, and a similar prohibition should attach as far as possible to quadrupeds and birds, wild and tame. Disinfectants may even be given to the sound animals that have been exposed to contagion. A tablespoonful of charcoal—animal or vegetable—may be given daily to each pig in the food. Twenty grains of bisulphite of soda, or 10 drops of carbolic acid, or 10 grains of sulphate of iron, may be used instead, and a teaspoonful each of sulphur and gentian may be added with advantage. When a herd has been freed from the disease, a most exhaustive disinfection of the whole premises, manure, and other products is imperative, and it is usually desirable to change the site of the hog-pen and run to obviate any future effects of this most virulent contagion. Old and rotten wood-work should be burned.

In purchasing pigs, buyers will consult their interests by avoiding markets, and going rather to the breeders whose stock is known to be healthy, and by seeing personally to the thorough cleansing and disinfection of loading-banks, cars, boats, &c., which they must use in bringing them home. And, after all such precautions, newly-purchased swine should invariably be placed in quarantine, at a safe distance from other hogs, and kept there for three weeks, with separate attendants, until they have been proved sound.

As in the case of other fatal contagions, this could doubtless be kept in check, or even completely extinguished, by a uniform system of destruction of the infected, and disinfection of their carcasses and all with which they have come in contact. Such a proceeding would imply an amount of governmental supervision and pecuniary outlay that would be profitable in the long run, though the past experiences of the American people have scarcely prepared them to sanction it.



Group of Alpacas.

PLATE IX.

INTRODUCTION OF THE ALPACA.

In the latter part of 1875, correspondence was had between the Commissioner and Hon. Francis Thomas, late minister to Peru, (since deceased,) concerning a small flock of alpacas which that gentleman had imported from Peru and placed on his farm at Frankville, Alleghany County, Maryland. In a letter of October 8, 1875, Mr. Thomas, inclosing a sample of the wool of four months' growth, remarked: "The fiber of a fleece of twelve months' growth often exceeds fifteen inches in length, and the fleeces average from 7 pounds to 10 pounds each in weight. The animals live to the age of twenty, twenty-five, and sometimes thirty years; are too large and bold to be worried by dogs, and are very docile and tractable. I think you will concur with me in the opinion that this experiment which I am conducting is well worth the expense which I have incurred, especially when we consider the public benefit which would accrue in case of my success." The illustrations here given are from photographs of several of the flock. See plate LX.

Attempts have been made at various times in this country, in Europe, and in Australia to introduce the alpaca, but generally without profitable result. Various causes have contributed to the failure of these efforts. Sometimes the confinement on shipboard during a long voyage, with impure air and unaccustomed food, has nearly destroyed the stock. Again, the animals, when brought to their destined abode, have been placed on luxuriant clover pasture, or other feed, so much richer than the coarse herbage of their native regions that disease has fastened on the whole flock.

The alpaca is indigenous in the mountain regions of Peru, and thrives in the highest inhabited districts of the Andes, where the cold is more severe than in most parts of the United States. Accustomed to the vicissitudes of such regions, and inured to cold, damp, hunger, and thirst, it is especially adapted to bleak hill-districts. Yet it is said to do well in most localities where the air is pure, the heat not oppressive, and water for bathing readily accessible. The latter is stated to be indispensable to the health of the animal, which, when deprived of this requisite, soon becomes fevered and infected with scab.

While the introduction of the alpaca into this country still remains a matter of experiment, there is no known reason why such experiments should not be successful, when properly conducted, in localities affording some approximation to the native conditions of the animal. Not to mention many elevated situations in the Atlantic, Northern, and Central States, the regions lying along the Rocky Mountain ranges have been indicated as presenting good opportunities for such trials.

HISTORY OF OUR RURAL ORGANIZATIONS.

Believing that organizations formed for the purpose of promoting and advancing the sciences of agriculture, horticulture, pomology, and the mechanic arts have accomplished much good, and are capable of still more effective work, this Department has ever taken a lively interest in their formation, and has extended them all the assistance and encouragement its limited means would allow. In this centennial year.

and as one of the evidences of the progress of the country—as shown by the formation, growth, and operations of these associations—a brief history of some of the more prominent ones is given below. A majority of the States have State societies or State boards of agriculture; some contain district associations, composed of only portions of the State, while all contain a greater or less number of county societies, governed, in many instances, by the State association, to the officers of which they are required to make an annual report of their operations during the year.

Some months since the Department addressed a circular-letter to the officers of all the more important rural organizations of the country, asking for the necessary information required in the preparation of this paper. Some of them replied promptly, others somewhat tardily, while a few made no reply to the request. A history of these associations is therefore necessarily omitted.

CONNECTICUT STATE AGRICULTURAL SOCIETY, AND STATE BOARD OF AGRICULTURE.

The Connecticut State Agricultural Society was incorporated in 1852. The first annual fair was held, in New Haven, in October, 1854. The exhibition was a great success, and a happy surprise in the variety and amount of manufactured goods exhibited, in the large collection of blood and stock of various breeds, and in the magnificent show of fruit and other horticultural products.

The society continued to hold successful fairs each year (except 1861) till 1862—seven fairs in all. The result was a general improvement in the stock of the State; a favorable impetus was given to fruit-culture, and the manufacturers obtained their share of benefits in advertising their wares, and the opportunity thus afforded to the producers from all parts of the State to meet on common ground was highly encouraging to every branch of industry. The disorganizing effects of the war dissuaded the society from an attempt to hold another fair. It has maintained its organization, but has engaged in no active work since 1862. The presidents of the association during the years of active work were Messrs. S. H. Huntington, N. B. Smith, and E. H. Hyde, which office is still held by the latter. Mr. Henry A. Dyer was the first corresponding secretary, and was succeeded by Mr. T. S. Gold, who still holds the position.

The Connecticut State Board of Agriculture, organized in 1866, has not attempted to hold any fairs, but has been at work by lectures, discussions, chemical investigations, and its annual reports, in collecting and diffusing information among the farmers of the State. In this way it has relieved the State Agricultural Society of much work it had undertaken, and has been as useful as its predecessor.

In 1857, Prof. S. W. Johnson, of the Sheffield Scientific School of Yale College, was employed by the State Society to make a chemical examination of commercial fertilizers, muck, and other manures. This work was followed by the society for several years, and has been since prosecuted by the State Board of Agriculture. The leading fertilizers of the State have been examined from time to time, their composition and value has been published, with suggestions for their proper use, with the most gratifying results. It would seem to be a well-established fact that this single branch of work, in banishing useless fertilizers from the State, and encouraging the use of the proper means of fertilization, has been of vastly more value to the farming community than the entire

amount bestowed upon the State society or the board of agriculture. For the purpose of pursuing these and similar investigations, in 1875 the general assembly was petitioned to establish an agricultural experimental station, and an appropriation of $2,800 per annum, for two years, was made for this object, to the trustees of the Wesleyan University at Middletown. Prof. W. O. Atwater is the director. The university gives the use of its fine laboratory, and the work of the station, the first established in America, has begun under favorable auspices.

The State board receives from the State treasury an annual appropriation of $2,500, and the State prints for distribution six thousand copies of its annual reports. The board was abolished by the general assembly in 1870 and re-organized in 1871. It consists of the governor, four members appointed by the governor, one member from each county chosen by the incorporated societies of the county, and a secretary—fourteen members in all. A succession of governors have held the office of president, and Mr. E. H. Hyde has been continuously the vice-president and acting president, with Mr. T. S. Gold as secretary.

The winter meetings have steadily increased in interest and value from the beginning. The increasing attendance indicates that the farmers appreciate the opportunities thus afforded them to improve their knowledge of their calling. The plan of work has been to concentrate the labor of each year upon some one subject or class of subjects, as "Cattle Husbandry," "The Dairy," &c. The success of this effort, as shown in the able reports of the board, by the full and varied collection of facts upon each topic, fully justifies the continuance of the practice.

GEORGIA STATE AGRICULTURAL SOCIETY.

In pursuance of a call signed by forty-four prominent citizens of Georgia for an "agricultural fair and internal-improvement jubilee," at Stone Mountain, on Monday after the second Wednesday in August, 1846, the Southern Central Agricultural Society was organized, with over sixty members. This meeting occurred immediately after the completion of a continuous railroad line from the Oostenaula River (near the extreme northern boundary of the State) to the seaboard, a fact which seems to have inspired the signers of the call with the determination to organize into a body for the purpose of more effectively advancing the material interests of the State. The meeting took place in a room of the Stone Mountain Hotel, and the fair, the first of the society, was held in a grove adjoining the village, and the only "articles" exhibited were a jack and jennet, the property of Mr. Graves, the proprietor of the Stone Mountain Hotel.

The four first fairs, viz: in 1846, 1847, 1848, 1849, were held at Stone Mountain. In 1847, there were received for annual memberships $44, and $70.50 were expended the same year in premiums. In this year the exhibition took place in a ten-pin alley, and afterward in buildings erected by the enterprising citizens of the village. In 1848, the receipts from memberships amounted to $162; from admission to the grounds, $103.44; total, $265.44. In 1849, the total receipts were $462.87 from all sources. These figures indicate the small degree of interest felt at the time by the mass of the people in agricultural progress.

In 1850, the fair was held at Atlanta, to which place the annual meeting of the society had been removed, and the record gives $876.77 as the total receipts. But in 1851, when the fair was held at Macon, the society seems to have made considerable of a forward movement, having realized from receipts the sum of $4,178.73, and expended in premiums

$4,074.23. This exhibition was declared to have been the most successful of the kind ever held at the South. The success of the enterprise was now no longer a matter of speculation, and from that time forward the society has been rapidly progressing, extending its circle of influence and usefulness and enlarging the scale and magnitude of its operations.

The society was first chartered under the name of the "Southern Central Agricultural Society," by an act of the legislature approved February 17, 1854. The charter was very liberal, and besides the privileges and obligations usually conferred upon companies and associations, it also granted the power to establish an industrial institute, with experimental farms attached; to hold annual or semi-annual fairs, and to appoint police during its fairs clothed with full authority to preserve order. By an act approved December 20, 1860, the charter was amended so as to change its name to that of the "Georgia State Agricultural Society," and appropriating from the State treasury $2,500 annually to the society. This act is still in force.

From 1860 to 1866, the period covered by the war, the society suspended all operations, and had only a nominal existence. A few of those who conceived and first gave life to the enterprise met in the city of Macon in December, 1868, re-organized, or rather revived the society, and put it in active operation again. In November, 1869, in the same city, the first fair after the close of the war was held. It was estimated that over fifty thousand strangers visited this exhibition. A notable feature of the occasion was the presence of a large number of distinguished gentlemen from all sections of the Union—invited guests of the society—who mingled in friendly intercourse and gave their advice and efforts in behalf of this great cause. Among those present were Hon. Horace Capron, Commissioner of Agriculture; Hon. Frederick Watts, the present Commissioner of Agriculture; General Wade Hampton, of South Carolina, and others. Since then, the society has been holding its fairs alternately in the cities of Atlanta and Macon, each of these cities paying to the society the sum of $3,000 on the year the exhibition is held at that place, besides furnishing grounds thoroughly equipped free of charge. This arrangement is to continue for ten years, including 1869.

In addition to its annual fairs, the society holds two semi-annual conventions. There are in co-operation and correspondence with the State society about one hundred and twenty county agricultural associations and neighborhood farmers' clubs, having from twenty to one hundred members each, which are required to make regular annual reports of their progress, &c., to the parent society. The conventions are held on the second Tuesdays in February and August of each year, at different places, and so arranged that the February or spring convention is held in the southern part of the State, and the August or fall meeting in the northern section. They are composed of the life-members of the society and delegates from the county associations and neighborhood clubs above referred to. The conventions usually comprise about three hundred accredited members. The meetings, which continue for three days, are arranged by a programme previously prepared, and the exercises consist of addresses by competent speakers on practical and scientific subjects relating to agriculture, together with reports on any particular subject which a committee from the society may have been appointed to investigate. The professors of agriculture and agricultural chemistry in the Georgia State College of Agriculture and the Mechanic Arts—an institution which is in thorough sympathy and hearty co-operation with the society—make, at each meeting, very elaborate and extended reports

of their operations on the experimental farm and in the laboratory. The addresses are followed by discussions on the subject, in which any member adds his own practical experience, and elicits further information by propounding questions to the speaker. At the night sessions, there are held what is termed "experience meetings," in which there is a free interchange of views and opinions, in an informal way, on any subject which may be sprung. The addresses and discussions are reported verbatim, published in book-form, consisting of 200 pages, or more, and distributed without charge by the State Agricultural Society among the members of the county associations and citizens generally who may desire them, thus diffusing knowledge among the farmers and keeping them abreast of the times in scientific agriculture.

As showing the progress of the society, it may not be out of place to enumerate some of the works which it has accomplished, and in which it is now engaged. It is diffusing, without cost, among the people, by means of the printed proceedings of its semi-annual meetings and the transactions of its annual fairs, the latest information on agricultural subjects. It seeks dignify and elevate the profession of farming, causing it to be regarded as a science instead of a make-shift and drudgery. It has brought about less planting and more farming; concentrating forces and resources on a smaller area, and bringing that to a higher state of cultivation and production. It has induced thought and investigation on the part of the farmers themselves. It has caused economy and thrift to reign where waste and profligacy prevailed. It exerts a most salutary effect upon the legislation of the State, and an indorsement by it of any measure affecting the interests of agriculture is to insure its favorable consideration. The geological bureau and agricultural department of the State are directly the result of its recommendation and influence.

The society, from its organization to the present time, has had six presidents and five secretaries. Mr. Thomas Stocks, of Greene County, was the first president, and served for a number of years. Then came Mr. Mark A. Cooper, of Barton County, who was succeeded by Mr. Richard Peters, of Fulton County, and he by Mr. David W. Lewis, of Hancock County, who served during the period of the war, and in 1868 was succeeded by Mr. Benjamin C. Yancey, of Clarke County. After serving two terms, Mr. Yancey was succeeded by Mr. Alfred H. Colquitt, the present incumbent, who has been unanimously re-elected for six consecutive terms.

Mr. D. W. Lewis was the first and only secretary of the society from its inception up to 1852. Mr. James V. Jones, of Burke County, succeeded him, and Dr. James Camak, of Clarke County, succeeded Mr. Jones. On the revival of the society, in 1868, Mr. Lewis was again elected secretary, and served till February, 1872, when he was succeeded by Mr. Samuel Barnett, of Wilkes County. Mr. Barnett retired in August, 1873, when Mr. Malcolm Johnston, the present incumbent, was elected.

The society occupies rooms in the Capitol building at Atlanta; has a library of about 3,500 volumes, among which are some rare and valuable works on agriculture. It enrolls about 60 life-members and 4,000 annual members, (members of the county societies.) In August of this year it will have completed its thirtieth anniversary.

ILLINOIS STATE HORTICULTURAL SOCIETY.

In October, 1851, the Northwestern Fruit-Growers' Association was organized in Illinois, and held meetings each year thereafter, with one

exception, (1854,) for discussion and the making and correcting of lists of fruits, for lectures and essays upon pomology and general horticulture, until the year 1857. This association, though in name a northwestern society, was almost wholly sustained by residents of the State of Illinois. In the year 1856, the Illinois Horticultural Society was organized at Decatur, with Dr. E. S. Hull as president, Mr. J. E. Starr, recording secretary, and Mr. O. B. Galusha, corresponding, secretary. In 1857, at the next annual meeting, the Northwestern Fruit-Growers' Association held its annual meeting at the same time and place, and voted almost unanimously to merge itself into the Illinois State Horticultural Society. This society has held meetings each year since, at different cities in the State, usually commencing upon the second Tuesday of December and continuing four days. The work of the society at first consisted mainly of essays, lectures, and discussions upon the cultivation, species, and varieties of trees and fruits; but gradually the scope of its aims and work widened until it embraced a large list of topics related to scientific and practical horticulture. Standing committees reported yearly upon the following subjects: Entomology, botany, and vegetable physiology, ornithology, (as relating to horticulture,) meteorology, geology, soils, landscape-gardening, arboriculture, general horticulture, orchard and vineyard-culture, vegetable-gardening, floriculture, utilizing and marketing fruits, and berry culture. These committees are selected from practical and scientific men, residents in the northern, central, and southern portions of the State, so that their reports and the discussions upon them are of great value to agriculturists, horticulturists, and scientists in all parts of the State.

The society, until the year 1867, published its transactions in a greatly condensed form from funds contributed by its members, but in that year the general assembly appropriated the sum of $2,000 for the use and benefit of the society, thus enabling its officers to enlarge and improve the number and style of the volumes. This appropriation has been continued regularly since that time, and the society has annually published a neatly bound volume of about four hundred pages. All the reports of the State entomologist have been published and bound with these volumes, adding much to their value. These books have been distributed among the members, and sold to non-members at $1 each; they have also been donated in considerable numbers for school-libraries.

For the past few years, the membership of the society has averaged nearly two hundred—more than this number, if including the members of auxiliary district societies of the State, whose members are entitled to copies of its transactions.

The following-named gentlemen have served the society as president since its organization: Messrs. E. S. Hull, C. R. Overman, Samuel Edwards, John A. Kennicott, O. B. Galusha, George W. Minier, Smiley Shepherd, John P. Reynolds, Parker Earle, Elmer Baldwin, A. M. Brown, T. McWhorter, W. C. Flagg, Arthur Bryant, sr., James E. Starr, M. L. Dunlap, Robert Douglas.

The secretaries have been as follows: Messrs. O. B. Galusha, James E. Starr, Samuel Edwards, J. T. Little, F. Starr, H. C. Freeman, C. T. Chase, W. C. Flagg, W. G. Ferguson, C. W. Murtfeldt, J. M. Pearson. Mr. Galusha is the present secretary, and has held the position most of the time during the existence of the organization. Mr. Jonathan Huggins has held the position of treasurer since 1867.

The affairs of the society have been managed by an executive board, consisting of from five to eight persons, residing in different divisions of the State. These horticultural divisions, as made by the society, and

recognized by the general assembly, are three grand divisions, styled the northern, embracing twenty-three counties; the central division, thirty-eight counties, and the southern division, forty-one counties. These divisions are subdivided, and one vice-president or member of the committee on general horticulture is appointed in each of these subdivisions to report upon the present status of horticulture therein.

ILLINOIS (NORTHERN) HORTICULTURAL SOCIETY.

This association was organized in 1868, under authority of an act of the legislature of the State. This act divides the State into three horticultural divisions or fruit districts—the northern, central, and southern—each division being represented by an association in active operation. The president and first vice-president of these societies constitute the State board of horticulture, which board, through its secretary, has the arrangement and supervision of the publication of the annual report, in aid of which the State makes a yearly appropriation of $3,000.

The annual meetings of the association are usually held in December or January, and continue for five days. At these annual gatherings fine displays of fruits, flowers, vegetables, wines, cordials, and ciders usually take place. The society holds no fairs for the simple exhibition of articles.

Mr. L. K. Scofield, of Freeport, is president of the association for the current year. Mr. D. Wilmot Scott has been corresponding secretary since the organization of the society.

INDIANA STATE BOARD OF AGRICULTURE.

The Indiana State Board of Agriculture is a corporate body, created by act of the legislature in 1851, and is composed of sixteen members, representing as many districts into which the State is divided for such representation. The terms of one-half the members expire annually, and their places are filled by election, held at the annual convention of delegates from county and district societies on the first Tuesday after the first Monday in January of each year.

The board was created to promote agriculture and the mechanic and household arts, and to this end annual exhibitions have been held since its organization. The wisdom of the law creating the board is demonstrated by the marked improvement in all agricultural pursuits, and the machinery and appliances by which they are carried on, and the grand results in developing the resources of the State, much of which improvement seems to be directly traceable to the agency of this organization. It is further manifested by the number of agricultural societies now in existence within the State, which were also created through the agency of the board. The organization of county and district societies dates back to 1852, the time of the first State fair, which marks an important period in the history of the State. There are now in existence, under the supervision of the board, twenty-one district and seventy-two county organizations; also a large number of township societies, not including nineteen hundred granges.

In 1856, the board removed all limits in competing for premiums, which course was soon followed by the county societies of the State and other State organizations. This arrangement was a great stimulus to the introduction of the best grades of horses, cattle, sheep, and hogs, as well as improved machinery from adjoining States, and has developed local societies to such proportions as to almost rival in importance the

parent or State society. The annual fairs throughout the State are now considered indispensable. The growth of these institutions has been gradual and permanent, and the larger portion of the reports from county and district societies for the year 1874 indicate the most successful exhibitions ever held by their respective associations. The county agricultural societies are required to include in their annual reports to the board a statement of the condition of agriculture in their respective counties, and other matters of general interest to the public.

In view of the great necessity of a geological survey, and the demand for its rapid prosecution, it was deemed advisable by the board of agriculture to ask for an annual appropriation for the purpose, and accordingly, upon its recommendation, on the 7th day of March, 1869, the legislature passed an act creating a department of geology and natural history, under the auspices of the State board, and on the 22d day of the same month, Governor Baker appointed to the office of State geologist Prof. E. T. Cox, who still holds the same, and is accomplishing much good in making known the great extent of the mines and other natural resources of the State. The results accomplished by the prosecution of this survey have been published from year to year, in six volumes. The State contains many rich beds of bituminous coal, of which there are three varieties, viz, coking, non-coking, and cannel coal. There are fourteen distinct seams. In Pike County, two seams attain the thickness of ten feet each. The block-coal seams range from three to four and one-half feet.

In the year 1872 the National Swine-Breeders' Convention was organized under the auspices of the board, and held their first meeting in its rooms. The National Short-horn Breeders' Convention originated in the rooms of the board in the same year, and held their first meeting conjointly with the Indiana Short-horn Breeders' Association.

In 1872, the annual exhibitions of the board had assumed such magnitude that it was determined to unite with the customary annual fair, which lasted but one week, the more modern plan of an exposition, to continue for a larger period, (thirty days;) and in accordance therewith had erected, at a cost of over $150,000, extensive and commodious buildings, adapted to the advantageous display of machinery and articles of every description. The board now owns property to the amount of $350,000, and have paid in premiums $138,000 since its organization.

During an existence of twenty-three years, the board (consisting of sixteen members, representing as many districts into which the State is divided for such representation) has been composed of ninety-six different persons.

INDIANA STATE HORTICULTURAL SOCIETY.

In 1842, a few zealous horticulturists, nearly all of whom have long since passed away, organized, at Indianapolis, the State horticultural society. Owing to the difficulty of attending its meetings, through a lack of public conveyance, together with numerous other obstacles that then beset the laborers in the field of horticulture, the society soon died out; not, however, without having accomplished much good. During the brief existence of this organization, and mainly through its instrumentality, were brought to notice many new varieties of fruits, while old ones were disseminated throughout the West and Northwest. Rev. Henry Ward Beecher, then a citizen of Indianapolis, edited and published a monthly journal devoted to agriculture and horticulture, called the Western Farmer and Gardener, through which the discussions and proceedings of this pioneer society were disseminated.

During the autumn of 1860 a new and more successful effort at organization was made, from which has grown the present flourishing society, bearing the original title. It was organized, as the Indiana Pomological Society, with a constitution providing for regular biennial meetings, in January of each alternate year. The proceedings of these meetings were published in pamphlet form. Both the title of the society and its constitutional provisions were soon found inadequate to the increasing demands for horticultural information, and a change of each was effected in 1863, substituting "horticultural" for "pomological," and providing for annual sessions, in January.

In 1866, the first bound volume of transactions was published, and in 1869, through the aid of friendly legislation, the State assumed the responsibility of the publication of its reports; all other expenses, however, still being met by the society. Its growing importance was recognized in 1873 by an additional State appropriation of $500 per annum; and, under a special act of the last general assembly, the society is now permanently incorporated as one of the institutions of the State, with a representative in the board of trustees of one of the professors of Purdue University.

During the existence of the society, it has been presided over by Messrs. Reuben Ragan, John A. Matson, I. D. G. Nelson, Dr. A. Furnass, J. C. Ratliff, and Joseph Gilbert; while Messrs. T. A. Loyd, W. H. Loomis, George M. Beeler, S. V. Morris, Seth W. Pearson, T. A. Bland, J. G. Kingsbury, and W. H. Ragan have served as secretaries.

Many able papers have, from time to time, been read before the society. These, together with the interesting and valuable discussions which they have elicited, have been published with its transactions, forming a series of volumes of great value.

The society has held no regular fairs, yet a leading feature of the annual meetings has been the fruit and floral exhibitions, which at times have been very creditable. Until 1874, the annual meetings were held in Indianapolis, but the migratory plan has now been adopted, with the promise of good results. The nucleus of a good library and cabinet is slowly forming, to which additions are being made as the funds of the society will justify.

The good results accomplished by the labors of the society are being manifested throughout the State by a growing and rapidly-increasing interest in horticultural pursuits. Under the impetus thus given to this branch of productive industry, many valuable auxiliary societies have been organized and sustained. A few of such are the Fort Wayne, Richmond, Terre Haute, and Plainfield societies, with many others, which, though of less importance, are each doing good work. The refining influence of these associations is having a beneficial effect upon the social and intellectual conditions of their respective neighborhoods.

KANSAS STATE BOARD OF AGRICULTURE.

At a meeting held March 5, 1862, in the hall of the house of representatives, at Topeka, Kansas, for the purpose of organizing a society for the promotion and encouragement of agriculture and the mechanic arts, Mr. F. P. Baker was called to the chair, and Mr. J. D. Church appointed secretary. At this meeting a constitution was adopted and permanent officers elected. This constitution remained in force and without material change until 1872. The society was incorporated by the general assembly March 6, 1862, the day following its permanent organization.

For some years the principal work of the society seems to have been

to hold competitive exhibitions. This was substantially its policy until 1871. There was, however, organized what were called farmers' class-meetings, where discussions were had upon the various subjects of farm-husbandry. Some effort was made to collect statistics through voluntary correspondents, but it was soon abandoned. The Kansas Farmer, a sixteen-page pamphlet, containing all the transactions of the society, was issued May 1, 1863. In 1864, the society published an annual register, which contained much valuable general and local information.

By act of the general assembly, approved February 10, 1872, the State agricultural society was superseded by the State board of agriculture. The governor and secretary of State were made *ex-officio* members of the board; the presidents of district and county societies were made *ex-officio* members of the annual meeting for the purpose of electing officers and the transaction of all other business. A permanent home for the executive officers of the board was provided in the capitol building, where there had been a temporary lodgement since 1870.

In 1872, an effort was made to collect agricultural statistics for the annual report through voluntary correspondents, but with little success. By an act of the general assembly, approved March 6, 1873, the State board was required to furnish blanks to the township assessors throughout the State, upon which the assessors were required to make returns of statistics relating to "agriculture, horticulture, stock, manufactures, apiaculture, coal and stone, mineral-paint," &c. All this information was required to be published in the annual report. The academy of science was made a co-ordinate department of the State board, and required to furnish a report for publication in said annual report. The assessors were also required to collect and forward to the agricultural rooms, for preservation and public inspection, samples of agricultural and other products; specimens of gypsum, lime, and sandstone, with a description of the character, extent, locality, and accessibility of each; of the various coal-beds, their qualities, location, and extent of the various ores of value, &c. Under the provisions of this law, through the aid of appropriations made by the State, a valuable museum of natural history has been collected.

The last State fair under the auspices of the board was held in 1874. Since 1870 an effort has been made to dispense with these expensive luxuries, and devote the entire energies of the board to the gathering, publication, and dissemination of statistics relating to the various resources, products, and industries of the State, and it is believed that the sentiment of the people will sustain this wise action. The State has been very liberal in extending aid to the society, and has, since 1863, annually appropriated large sums for the efficient performance of its work. Perhaps no State in the Union has been more liberal in this respect.

The following are the names of the gentlemen who have filled the position of president of the association since its organization, viz: In 1862, Lyman Scott; in 1863, 1865, 1866, L. D. Bailey; in 1867, 1868, 1869, R. G. Elliott; in 1870, 1871, J. S. Kallock; in 1872, H. J. Strickler; in 1873, E. S. Nichols; in 1874, 1875, 1876, George T. Anthony. As secretaries: In 1862, 1863, 1864, F. G. Adams; in 1865, 1866, John S. Brown; in 1867, 1868, 1869, H. J. Strickler; in 1870, 1871, 1872, 1873, 1874, 1875, 1876, Alfred Gray.

The officers by appointment of the board are as follows: Geologist, Prof. B. F. Mudge; entomologists, E. A. Popenoe and George F. Gaumer; meteorologist, Prof. F. H. Snow; botanist, Prof. James H. Carruth; chemist, Prof. W. K. Kedzie.

KANSAS STATE HORTICULTURAL SOCIETY.

This society was organized in Lawrence, Kans., December 10, 1867, and incorporated by act of the general assembly of the State December 20, 1869. In the month of December following it was re-organized by the election of officers provided for by the act of incorporation.

The State has been divided by the society into three geographical districts, known as the northern, central, and southern fruit-districts, each having a committee charged with the duties of reporting annually to the State society a list of fruits found to be adapted to the section of country embraced within their respective districts and upon other matters of general interest to horticulturists. The State has also been subdivided into four departments, respectively known as the north-eastern, northwestern, southwestern, and southeastern horticultural districts. Within these districts are established societies styled north-eastern, northwestern, southwestern, and southeastern horticultural societies, co-operating with the State society in all measures looking to the advancement of the science of horticulture. The proceedings of these societies are reported to the State society, and are made a part of the annual report of that society to the State. The membership of these district organizations is composed largely of delegates from local and county societies within its prescribed territory, and are represented in the meetings of the State society by delegates, two of whom become members of the society by virtue of their appointment. The board appoints a representative in each county to report upon its agricultural interests. In each county is established an office representing the county at large.

The first exhibition of Kansas-grown fruits, under the auspices of the State society, was made at Philadelphia September 16, 1869. The collection was composed of 216 varieties of apples, 27 varieties of pears, and 5 varieties of grapes. This collection, by special action of the Pennsylvania Horticultural Society, was awarded the highest testimonial ever given by that association—a fine gold medal, appropriately inscribed.

The second exhibition of Kansas fruits was made at Richmond, Va., during the thirteenth session of the American Pomological Society, in common with the Virginia State Horticultural Society, September, 1871. This collection contained 250 varieties of apples and 30 varieties of pears, and was awarded a diploma by the Virginia State Horticultural Society, "as the largest display of fruit, unexcelled in size, beauty, and excellence." This collection, under the management of the society, was exhibited in competition with the Missouri State Hoticultural Society during the State fair held at Topeka, Kans., September 16 to 20, 1872. At this fair, the society was awarded a premium of $100 for "the largest and best display of fruit exhibited by any State, county, township, society, or individual."

At the organization of this society, but six counties of the State were represented by delegates, and its membership, for some time, did not exceed a score of persons. At this date every section of the State is represented, and its annual meetings are crowded with representative men interested in the subject of fruit-culture. As an earnest, working body, the association will rank with similar societies in the older States.

As an evidence of the impetus given to fruit-growing in the State through the operations of this society, it will not be out of place to state that, during the eleventh session of the American Pomological Society,

held in Saint Louis, in September, 1867, when the fruit lists for the several States were being made up, and the name of Kansas was called, the only variety of fruit which had been successfully cultivated was announced by its delegate as a single peach, the "Red-cheek Melocotoon."

Some years ago, upon the recommendation of the society, the State established several experimental stations, through the aid of which the adaptation and non-adaptation of various kinds of trees, plants, fruits, &c., to the diversified soil, climate, and location of Kansas are being rapidly solved.

The following-named gentlemen have served as president of the society since its organization, viz: Messrs. William Tanner, William M. Hawsley, and E. Gale. Mr. G. C. Brackett has served as secretary of the society from its organization up to the present time.

MASSACHUSETTS STATE BOARD OF AGRICULTURE.

The preliminary efforts for the establishment of the Massachusetts State Board of Agriculture emanated from a meeting of the trustees of the Norfolk Agricultural Society, held January 28, 1851. It was there determined that the president and secretaries should be a committee to mature and adopt a plan for a convention of delegates from the various agricultural societies of the Commonwealth, to be holden at some convenient time and place, "the object of which shall be to concert measures for their mutual advantage, and for the promotion of the cause of agricultural education." This convention assembled at the State-house, in Boston, on March 20, 1851. The session lasted for several days. After a thorough discussion of the subject and a full interchange of opinion, a central board of agriculture was formed. It was organized September 2, 1851, by the choice of Mr. Marshall P. Wilder as president, Henry W. Cushman and John W. Lincoln, vice-presidents, Mr. Allen W. Dodge, corresponding secretary, and Edgar K. Whitaker, recording secretary. These, with three delegates from each incorporated society receiving the bounty of the State, constituted the board, which, after two years, was superseded by a State board of agriculture, with the secretary resident at the capital. The act of the legislature was passed in 1852, and the present secretary, Mr. Charles L. Flint, entered upon the duties of his office in February, 1853. By this act the governor of the State was a member of the board, and each incorporated society receiving the bounty of the State was entitled to send a delegate, the term of whose office was to continue for three years. To these were added three other delegates, to be appointed by the governor and council; the lieutenant-governor, secretary of state, and the president of the Massachusetts Agricultural College were subsequently made members *ex officio*.

By the act constituting the State board, all the duties which had been performed by the secretary of state in regard to agricultural matters now devolved on the secretary of the board. Thus a new and independent system of operations was established, whereby the secretary became the chief officer and organ of the board, on whom has since devolved the duty of digesting the returns of the societies and of preparing the annual volume of the department. This annual volume embraces a very complete and effective system of reports, containing abstracts of the various statements and experience of the best cultivators from all parts of the State. It also contains the essays and reports of the secretary and the reports of special committees on special subjects. These volumes, embracing a period of over twenty years, constitute a store-

house of information, a comprehensive library, embracing almost every subject in agriculture, and are eagerly sought after by both resident and foreign agriculturists. When the board was first established, but three thousand copies of the report were required to supply the demand; now ten thousand copies are found to be insufficient to meet applications.

The board is now a permanent department of the State government, receiving the confidence and favor of the people. It has established a uniform system of operations in the local societies of the State. Its office is continually open to its own people, as well as to those of other States and other lands, and its secretary is in correspondence with similar associations both at home and abroad, and thus it is able to keep up with the progress of improvement, receiving information and distributing the results of his investigations and the deliberations of the board.

MASSACHUSETTS HORTICULTURAL SOCIETY.

This society is now, excepting the Pennsylvania Horticultural Society, the oldest in the United States, and the New York Horticultural Society, (formed in 1818;) one or two others organized before the Massachusetts Horticultural Society have long since ceased to exist.

The first meeting looking to a formation of this society was held February 24, 1829. It was attended by sixteen gentlemen, and the Hon. John Lowell, who then stood at the head of the horticulturists of the State, presided. The society was organized and the constitution adopted on March 17, following, when it was announced that more than one hundred and sixty members had joined the association. The present number of members is over one thousand. The society was incorporated January 12, 1829.

The first president was Mr. Henry A. S. Dearborn, of Roxbury. A large number of honorary and corresponding members were chosen, both in this country and in Europe, and an active correspondence and exchange was kept up with them by Mr. Dearborn, which soon resulted in the acquisition of many valuable seeds and plants, as well as much important horticultural information, which was duly communicated to the society.

Immediately after the organization of the society, steps were taken toward the formation of a horticultural library, which is now the most extensive of the kind in the country, and is probably not surpassed in Europe. The number of volumes is 2,750, many of which are rare and costly illustrated works, and 350 pamphlets.

In 1831, the society undertook an enterprise which was, in some respects, the most important and fortunate in which it has ever engaged. This was the foundation of Mount Auburn Cemetery, the first of its kind in the country. With the cemetery it was intended to combine an experimental garden, a favorite object with the founders of the society. The cemetery was consecrated, under the auspices of the society, September 24, 1831. A conflict of interests arising, and it being found that the location was not adapted to the purpose of an experimental garden, the society transferred its title to the cemetery to the proprietors of lots on condition of receiving a certain part of the proceeds of all sales of lots thereafter. The income from this and other sources has given the society more ample means for the promotion of horticulture than has been enjoyed by any similar society in this country.

September 14, 1844, the society, by its president, Mr. M. P. Wilder, laid the corner-stone of horticultural hall, which is believed to be the

first building ever erected by a horticultural society for its exhibitions. This hall was dedicated May 15, 1845. The exhibitions, however, increased so rapidly in extent that in 1848 the association was obliged to hold the annual show in Faneuil Hall, and in 1860, its real estate was sold to advantage, and another site procured, on which the present spacious horticultural hall now stands, the corner-stone having been laid August 18, 1864, and the building dedicated September 16, 1865. The whole cost of the land and structure was over $250,000.

The chief means adopted by this society to promote the advancement of horticulture has been the offer of liberal premiums for the best fruits, flowers, and vegetables, as well as for the best cultivated and kept gardens, green-houses, and pleasure-grounds. The first schedule of premiums, in 1829, offered $93 in the fruit department—$60 for flowers, and $35 for vegetables. The amount appropriated for prizes in 1874 was $5,800, not including a standing offer of nearly a thousand dollars for new seedling fruits, flowers, and vegetables. Competition for these prizes is not confined to its members, but is invited from all cultivators. The whole amount paid in prizes, from the foundation of the society to the end of the year 1874, is more than $80,000. Exhibitions have been held regularly from the beginning, every Saturday through the summer and autumn months, with a grand annual exhibition in September, and in later years a special rose show in June. These exhibitions have not only diffused a knowledge of horticulture among the members, but have educated the taste of the community generally. Its library, now regarded as one of the best in the country, has also contributed largely toward educating the people as to the primary objects and aims of the association.

During the winter months weekly meetings are held for the reading of essays and the discussion of horticultural subjects, which are published in the transactions of the society. These publications now fill seven octavo volumes, including, besides essays and discussions, the addresses delivered at several of the anniversaries of the society, reports of exhibitions, &c., and, for a time, were illustrated with colored engravings of fruits and flowers in the highest style of art.

The exhibitions, which have been steadily maintained for forty-seven years, have not only been a source of refined pleasure to the thousands who have beheld them, but have been the means of educating the community in the choicest productions of horticulture, and of inspiring a love for the art, which has brought it to a greater degree of perfection in Massachusetts than it has attained in any other part of the country, and has made the environs of Boston renowned for their beauty.

The hall of the society is on Tremont street, Boston, and the library-room is open every day during business hours. The treasurer and librarian, Mr. Edwin W. Boswell, and the editor of the society's publications, Mr. Robert Manning, are in constant attendance, and ready to give welcome to horticulturists from abroad.

The following-named gentlemen were officers of the society for the year 1875, viz: Francis Parkman, president; Edwin W. Boswell, treasurer and secretary; Edward S. Rand, jr., recording secretary; William Boott, professor of botany and vegetable physiology.

MICHIGAN STATE AGRICULTURAL SOCIETY.

As early as the year 1830, while Michigan was yet a Territory, an agricultural society was formed in Oakland County. Owing to the sparsity of population, but few people took an interest in the affairs of

the association, and at the end of about two years it ceased to exist. In 1833 a charter secured for the incorporation of the Michigan State Agricultural Society, but an organization was not effected.

On the evening of March 17, 1849, a meeting of citizens was held in the State-house at Detroit, at which preliminary steps for the organization of a State society were taken. Officers were elected, and an act prepared for the incorporation of the society. This act was presented to the legislature, passed, and approved by the governor, April 2, 1849. The general assembly also passed an act appropriating $400, the same to be paid upon the receipt of an affidavit of the treasurer that the society had raised a like sum by subscription.

At the first meeting of the executive committee, held in Detroit, May 22, 1849, a State fair was decided upon. This fair was held in Detroit on the 25th, 26th, and 27th of September following, and proved very successful in every respect. The receipts were sufficient to pay the premiums awarded, all expenses of the fair, and left about $1,250 in the treasury. This exhibition was the means of giving a great impetus to the agriculture of the State. Immediately after the fair, several new county societies were organized; improved stock was sought for, purchased, and taken into the State. Information upon all subjects pertaining to agriculture was earnestly inquired for, and this information, as it was gained, was, to a great extent, acted upon. The result was soon manifested in greatly improved farming, improved breeds of stock, and the organization of the first State agricultural college established in the United States. Nearly all the older organized counties in the lower peninsula of the State maintain active county societies, and the result is seen in the rapid advancement of everything pertaining to the agricultural and horticultural interests of the various sections in which they are located.

The first fair of the State society was held on a piece of ground which measured 370 by 800 feet. They eventually became so popular that many acres were necessary for the display of animals and articles, and the accommodation of visitors. The premium-list has risen gradually from $1,000 in 1849, to $20,000 in 1875. For several years the legislature made an annual appropriation from the State treasury to aid the society; it does not now receive aid from that source. By legislative enactment, three thousand copies of the annual reports of the State and county societies were printed for distribution up to the year 1859.

In 1861, by authority of an act of the general assembly, a State board of agriculture was organized. The State agricultural college was given charge to this board. The State and county organizations were to make their annual reports to the State board, and these reports were to be printed with the proceedings of that board. The reports of the State society for 1867 and 1868 were published, and these two are the only ones that made their appearance in this connection from the organization of the board up to the year 1873. This is much to be regretted, as in 1872 a portion of the records of the society were destroyed by fire. The reports of the State society are now regularly printed with the reports of the State board.

The directors of the society now consist of a president, secretary, treasurer, and an executive committee of twenty members. The board of directors hold their annual meeting in December or January, to settle the affairs of the society for the past year, and to make arrangements for the ensuing year. The officers of the society for the current year are: E. O. Humphrey, president; C. F. Kimball, secretary; A. J. Dean, treasurer.

MICHIGAN STATE POMOLOGICAL SOCIETY.

This society was temporarily organized in 1870, and permanently established, under an act of the legislature, in July, 1871. Its object is the development of facts regarding the best varieties of fruits, and the dissemination of information as to the most approved modes of cultivation, as shown by years of careful experiment. During the few years of its existence it has accomplished much good, by awakening a deep and wide-spread interest among the people of the State in the cultivation of both fruit, flower, and ornamental trees and plants. While the improvement of fruit is its principal object, much attention is devoted to the advancement of kindred interests.

From the beginning, the society has held annual State fairs, generally in conjunction with some kindred organization, thus insuring a large attendance and fine displays of fruits and flowers. Its first fair, in 1870, was held in Grand Rapids, in connection with that of the Kent County Agricultural Society. This county association donated $250 to be applied in the payment of premiums offered by the Pomological Society. The next two fairs were held in the same city, during the years 1871 and 1872, in connection with the Northern Michigan Agricultural and Mechanical Society. In 1871, the premiums offered and awarded amounted to $1,000, and in 1872 to $1,200. At the Union State fair, held at Grand Rapids in 1873, the sum of $1,300 was paid by the society in premiums. In 1874, a still more successful Union State fair was held at East Saginaw, at which $1,200 was paid for premiums on fruits alone. At the last Union State fair, held at the same place, in conjunction with the Michigan State Agricultural Society, in 1875, the sum of $1,700 was paid in premiums on fruits and flowers. This system of associated fairs or exhibitions is highly commended by its projectors, as it assures a large attendance and fine displays of articles in all the various branches of productive industry.

A marked feature of the work of the society is the labor of its orchard-committee. This committee examines and awards premiums on orchards, vineyards, fruit-plots, farms, ornamental grounds in city and country, nurseries, private and public conservatories and plant-houses, gardens, vegetable-farms, &c. The first committee was appointed in 1871, Mr. T. T. Lyon, a veteran pomologist of the State, at its head; the second committee, in September, 1872, with Prof. W. W. Tracy as chairman; the third committee, appointed in 1873, was presided over by Prof. W. J. Beal; that of 1874, by Mr. H. Dale Adams; and that of 1875, by Mr. D. R. Waters. These committees visit all parts of the State, and in the discharge of their duties are compelled to travel thousands of miles and award hundreds of premiums.

Another commendable feature of the workings of this association is its monthly and quarterly meetings. These meetings generally extend through two or three days, and, since the organization of the society, have been held in Grand Rapids, Benton Harbor, Kalamazoo, Ionia, Monroe, Lansing, Spring Lake, Traverse City, Battle Creek, South Haven, Jackson, and East Saginaw. The leading feature of these gatherings is the reading of the essays prepared for the occasion, and the discussions, which invariably follow. The papers and discussions have been carefully reported, revised, and published, under the supervision of the secretary, and now form a very valuable library. Six thousand copies of this report are annually distributed among the people of the State.

MISSISSIPPI PLANTERS, MANUFACTURERS, AND MECHANICS' ASSOCIATION.

The above-named association was organized in 1869, as a stock company, with shares valued at $50 each. It was incorporated in 1871, by the legislature, and $9,000 was appropriated by the State for the extension of buildings and the improvement of grounds. All the unoccupied State lands east of the capitol at Jackson and west of Pearl River were set apart for the uses of the society. The legislature subsequently made an additional appropriation of $4,500.

The object of the association is "to foster and encourage the agricultural, manufacturing, and mechanical interests of the State." It is managed by a board of directors—twenty-five in number—the governor, president of the senate, speaker of the house, auditor of public accounts, treasurer, and secretary of state, being *ex officio* members of the board. The directors are elected annually by the stockholders. The directors elect from their number a board of control, consisting of nine persons, who have the entire management of the business interests of the association, arrangements for exhibitions, &c.

The buildings are located within a few hundred yards of the State capitol. The grounds contain about sixty acres, and are permanently inclosed. The main exhibition building is 300 feet long and two stories high. The shed for the display of machinery is 200 feet long; there are also long rows of sheds for stock, and a track three-fourths of a mile in length for the trial of speed.

Exhibitions are held in the fall, and so far have been largely attended; the largest attendance was at the fair held in December, 1871. The annual receipts from these exhibitions vary from $6,000 to $8,000, which generally about cover the expenses. At the recent fair the State centennial board offered premiums with a view to getting up a display at the Centennial Exhibition at Philadelphia, which resulted favorably. This board is also organized under an act of the legislature, which appropriated $5,000 for its necessary expenses in collecting and forwarding articles to the National Centennial Exhibition. The charter of this association gives to each county agricultural society, auxiliary to this association, the sum of $200 to aid them in organizing.

The officers of the association for the current year are as follows: L. F. Montgomery, president; Joshua Green, treasurer; J. L. Power, secretary.

MISSOURI AND KANSAS WOOL-GROWERS AND SHEEP-BREEDERS' ASSOCIATION.

At a meeting held in Kansas City, Mo., in 1873, preliminary steps were taken for the formation of a wool-growers and sheep-breeders' association for Missouri and Kansas. At this meeting a committee was appointed to draft a constitution, to be reported at an adjourned meeting to be held at Topeka, Kans., during the progress of the Kansas State fair. This meeting was held during the following week. The committee reported, and the convention adopted a constitution and by-laws. Mr. W. B. Stone was elected president, and Mr. Samuel Archer, secretary. The objects of the association thus formed were declared to be the dissemination of information concerning the business of wool-growing and sheep-breeding, and to afford a medium by which those engaged in the business might co-operate with the National Wool-Growers' Association.

The first meeting of the association after its organization was in

Kansas City, February 3, 1874. The principal business transacted was the adoption of measures urging the Missouri and Kansas legislatures to enact laws taxing or liscensing dogs. The second meeting was held during the Kansas City exposition in 1874. At this meeting, resolutions were adopted indorsing the tariff-rates on wool and woolens, as enacted by Congress in 1867, and strongly urging the national association to use every effort with Congress to prevent a change in the duties imposed by that law, and to prevent a reciprocity treaty with Canada on any other terms than the rates imposed by the tariff of 1867. At this meeting, Mr. W. B. Stone was re-elected president, and Samuel Archer, secretary.

Prior to the formation of this association, but little interest was manifested on the part of the people of Missouri and Kansas in sheep-breeding and wool-growing. Within less than three years, a very gratifying change has taken place. A part of this is no doubt owing to the fact that farming has not been very profitable; neither has the keeping of horned cattle nor the raising of hogs paid as well as formerly, while the raising of sheep has been uniformly remunerative. The fact seems to be at last apparent, that large portions of both Missouri and Kansas are better suited to the keeping of sheep and wool-growing than for any other purpose, and that in the best grain-growing regions of these States sheep are as profitable as any other kind of stock. During the past year large flocks of the common coarse-wool sheep were driven out of Missouri into Western Kansas and Texas, and their places are being filled by those of a much better quality and grade.

The climate and soil of this region seem to be well adapted to the successful rearing of sheep. Foot-rot is scarcely known among flocks, while scab does but little damage in comparison with other sections. It is thought that more care in the handling and management of sheep will eventually eradicate this disease.

The western half of the State of Kansas, known as the eastern part of the plains, is well suited to keeping sheep in large flocks, and ranchmen are located there owning their thousands, which are herded during the day and feed on the buffalo or gramma grass winter and summer, requiring but a limited quantity of either grain or hay.

THE NEW ENGLAND AGRICULTURAL SOCIETY.

At the annual meeting of the Massachusetts State Board of Agriculture in January, 1864, it was resolved that it was important to the interests of agriculture that an association be formed which would bring together, at least once a year, all those in the New England States interested in agriculture and its kindred pursuits, and to that end it was decided necessary, as the initial step, to address letters to the officers of the several agricultural societies of New England, State and county, inviting their associations to send delegates to a proposed meeting to be held in Worcester, March 2, 1864, for the purpose of organizing such a society.

This meeting was held at the time stated, and was well attended. Before its adjournment a complete organization was effected. A. B. Chadsey, J. DeWolf Perry, and Thomas B. Buffum, of Rhode Island, and J. G. Webb, Benjamin Sumner, and P. M. Auger, of Connecticut, were among those who were present and took an active part in the proceedings of the meeting, and acted as members of the board of trustees for the first year. The society had no funds except the contributions made by gentlemen present to constitute themselves life-members of the association.

The price of life-membership was fixed at $3, but has since been increased to $8.

The society was organized by the election of George B. Loring, of Massachusetts, president; Charles L. Flint, of Massachusetts, and Henry Clark, of Vermont, secretaries; and Thomas Sanders, of Vermont, treasurer. Messrs. Flint and Clark continued secretaries only one year, when David Needham, of Massachusetts, was elected to the position, and has continued to hold the office to the present time. No change has been made in the office of president, and only three changes in the office of treasurer, Isaac K. Gage, of New Hampshire, succeeding Mr. Sanders, and George B. Riddle, of New Hampshire, Mr. Gage.

The society has held fairs in all the New England States—at Springfield, Lowell, and Medford, Mass.; at New Haven, Conn.; twice at Providence, R. I.; at Portland, Me.; at Concord, and twice at Manchester, N. H.; and at Brattleborough, Vt. These exhibitions have all been largely attended, and, although often held at apparently remote distances from a geographical center, they have never failed to receive a creditable display of the various productions and manufactures of the New England States. Generally they have been favored with good weather, and, with one exception, the receipts have been fully equal to cover the cost of premiums and all other expenses. The largest attendance on any one day was at Lowell, when it was estimated that nearly fifty thousand people passed through the gates into the grounds during the day.

As a part of the exercises incident to these exhibitions, an opening address has always been delivered by the president, and an annual address by the governor of the State in which the fair is being held. In connection with the fair, and as a part of the exercises of the occasion, farmers' meetings, for the discussion of important subjects relating to agriculture and kindred interests, have been held during the evenings of the first three days of the exhibition. These meetings have always been largely attended, leading farmers and stock-raisers from all the New England States generally being in attendance and taking an active part in the discussions. These debates have been phonographically reported by the Massachusetts Ploughman, which is the recognized organ of the society.

The society maintains its headquarters at Boston, Mass., in rooms at No. 45 Milk street, where it keeps on file all the principal agricultural journals, and some one in constant attendance to wait upon members of the association and strangers who may be interested in agriculture and its kindred industries.

The present officers of the society are: George B. Loring, president; Wilder P. Walker, Frederick Smyth, Frederick Billings, S. B. Phinney, William E. Barrett, and E. N. Hyde, vice-presidents; George W. Riddle, treasurer; and Daniel Needham, secretary.

NEW HAMPSHIRE STATE BOARD OF AGRICULTURE.

Local agricultural societies in the State of New Hampshire date back to the year 1814. Between this year and the year 1820 several county associations were organized, all of which received benefactions from the State. In 1820, the legislature passed an act providing for the formation and organization of a State board of agriculture, to consist of the presidents of the several county societies and a delegate from each. There were six societies in existence at the time, and consequently, if all were represented, the board, which was organized in 1821, consisted

of twelve members. Mr. William Badger was chosen president, and Matthew Harvey, secretary. Other members of the board were Samuel Grant, Rev. Humphrey Moore, Amos Kent, and Messrs. Gilman, Dinsmoor, Wilcox, and White.

After a brief period, a modification took place in the law, limiting the members to one from each county, to be chosen by the county societies. Gradually these societies became inoperative and disorganized, and the board ceased to exist. The law, though unrepealed, became entirely useless. Though many efforts were made during the next quarter of a century, it was not until the year 1870 that a new board was organized. In this year both branches of the legislature unanimously voted for an act re-organizing the board on a different basis, and shortly thereafter the governor and council appointed one member from each county to constitute the State board of agriculture. The first meeting of the new board was held at Concord, on Tuesday, August 23, 1870, and was organized by the election of Moses Humphrey as president and James O. Adams, secretary.

The act establishing the board provides that it shall investigate such subjects in relation to improvements in agriculture and kindred arts as it shall think proper, and shall cause to be analyzed samples of such commercial fertilizers as may from time to time be offered for sale in the State, collect and distribute grain and other seeds, solicit returns and reports from the different agricultural societies in the State, and make an annual report to the governor of such matters as will prove of interest to the farming community of the State.

Since the organization of the board it has been actively engaged in the investigation of many important subjects, and has issued two very able annual reports of about five hundred pages each.

NEW YORK STATE AGRICULTURAL SOCIETY.

The first State agricultural society of New York was established in the year 1791, Robert R. Livingston being the first president. The published transactions of this society are comprised in four volumes, issued in parts, and at irregular intervals, from 1792 to 1819, and contain a large number of valuable papers from some of the most eminent writers of that day, among whom may be named Chancellor Livingston, Ezra L'Hommedieu, Samuel L. Mitchell, and Simeon De Witt. Chancellor Livingston continued president of the society until his death, in 1813. On the 31st of March of that year, the society convened at the State capitol to hear the eulogium of that great man, who was not only eminent as jurist, patriot, and statesman, but was also the most enlightened agriculturist of his age and country. Simeon De Witt was the next president, and held the office until the dissolution of the society, which occurred under the provisions of an act of the legislature passed April 7, 1819, establishing a State board of agriculture. The secretaries of the society during the twenty-seven years of its existence were John McKesson, (at the first organization,) who was soon after succeeded by Samuel L. Mitchell and Benjamin De Witt; they, in 1810, by James Law, as recording secretary, and he, in 1814, by Theodoric Romeyn Beck. Mr. Law was again recording secretary in 1816–'17, and Jonathan Eights held the office in 1818.

It is worthy of note that, in the proceedings of the society published in 1794, and referring to a meeting held in 1793, it is recorded that "Col. John Smith produced the model of a plow-share, according to which it was projected to have that utensil made of *cast* iron, in order to

save expense in husbandry and come cheaper to farmers than those in common use forged from wrought iron; and Mr. Smith and Judge Hobart were appointed to get several cast for trial." Colonel Smith subsequently reported the entirely successful use of these shares in plowing his fields during the ensuing spring and summer.

The law of 1819, above referred to, entitled "An act to improve the agriculture of this State," inaugurated the system which has ever since controlled the relations of the State of New York to her agricultural societies, although from 1826 to 1832 that system was entirely, and from 1832 to 1841 practically, in abeyance. Concisely stated, the chief features of the system are the annual appropriations by the legislature of a sum of money to be distributed in a fixed ratio to such county agricultural societies as shall raise an equal amount by voluntary subscription, and the requirement of full annual reports from these societies to the State board or society, which, on its part, is required to report annually to the legislature.

In accordance with the provisions of this act, the president and delegates of the several agricultural associations of the State convened in Albany, January 10, 1820, and organized as a State board of agriculture, of which Stephen Van Rensselaer was elected president and Solomon Southwick secretary. The publications of the board thus established are comprised in three volumes, and contain many original and selected articles of great value to farmers even of the present day. In April, 1826, the board ceased to exist by the expiration of the law under which it was organized.

In February, 1832, the present State agricultural society was organized, under the presidency of the illustrious James Le Roy de Chaumont, with Jesse Buel as secretary, and was incorporated by an act of the legislature on the 26th day of the April following. Though organized with much apparent enthusiasm, the society accomplished very little until its re-organization in 1841.

The revival of the society owed its success to two things, the passage of the act for the encouragement of agriculture, May 5, 1841, (which was substantially a re-enactment of the law of 1819, excepting that the State agricultural society was substituted for the State board of agriculture, and was allowed a share of the annual appropriation,) and the insertion in the constitution of the society of a provision for holding an annual cattle-show and fair. The fairs and cattle-shows, beginning in 1841, at Syracuse, with a modest premium-list amounting to $675, have been held every year since, with almost constant success; besides their vast influence upon the improvement of the agriculture of the State, they have furnished an income for the prosecution of many useful works. The annual report to the legislature, with the surveys, reports, and contributions, published at the expense of the State, form the valuable series of transactions from 1841 to 1871, inclusive; and it is hoped that the policy which, in 1872, suspended their publication, will not find favor with succeeding legislatures. The society has continuously held the relations and discharged the duties to the State which in many other States of the Union are devolved upon the State boards of agriculture, and, with the exceptions of a small part of the appropriation for the promotion of agriculture and a few minor items, all the expenses have been defrayed from the resources of the society.

The following are the names of the presidents of the society from 1832 to 1876: 1832, James Le Roy de Chaumont; 1833 to 1835, Jesse Buel; 1836, Archibald McIntyre; 1837 and 1838, John P. Beekman; 1839, Anthony Van Bergen; 1840, Francis Rotch; 1841, Joel B. Nott; 1842 and 1843,

James S. Wadsworth; 1844, John P. Beekman; 1845, Benjamin P. Johnson; 1846, John M. Sherwood; 1847, George Vail; 1848, Lewis F. Allen; 1849, John A. King; 1850, Ezra P. Prentice; 1851, John Delafield; 1852, Henry Wager; 1853, Lewis G. Morris; 1854, William Kelly; 1855, Samuel Cheever; 1856, Theodore S. Faxton; 1857, Alonzo S. Upham; 1858, William T. McCoun; 1859, Abraham B. Conger; 1860, Benjamin N. Huntington; 1861, George Geddes; 1862, Ezra Cornell; 1863, Edward G. Faile; 1864, James O. Sheldon; 1865, Theodore C. Peters; 1866, John Stanton Gould; 1867, Marsena R. Patrick; 1868, Thomas Hall Faile; 1869, Samuel Campbell; 1870, Solon D. Hungerford; 1871, Richard Church; 1872, Miles Ingalsbe; 1873, Benjamin F. Angel; 1874, Harris Lewis; 1875, Alexander S. Diven; 1876, Edwin Thorne.

NEW YORK STATE DAIRYMEN'S ASSOCIATION AND BOARD OF TRADE.

The idea of this association originated with Hon. X. A. Willard, and upon his suggestion a call was issued and a meeting of a large number of leading dairymen of Central New York was held at Little Falls, N. Y., February 27, 1871, at which a plan was matured and adopted for inaugurating the New York State Dairymen's Association and Board of Trade. This organization was the first of its kind in this country, and probably the first of the kind in the world.

In an address delivered at the inauguration of the association, Mr. Willard recommended the organization of local auxiliary boards in every county of the State; and now every locality where any considerable quantity of cheese or butter is manufactured has its board of trade, essentially the same in their management as that of the State association.

The advantages of these boards of trade can better be estimated by noting the transactions and offerings at the trade-rooms at Little Falls and at Utica, for the year 1874, each of which amounted to about two and three-fourths millions of dollars.

The State association holds annual conventions at such place in the State as in the judgment of the executive committee will best promote the dairy interest. At these conventions discussions are had on all important topics relative to dairying. New experiences and developments are annually brought out and their merits fully discussed. The association has held five annual conventions, which have been attended by large numbers of people from all parts of the State, and from other States. The improvements in the manufacture and sale of cheese and butter must be attributable, in a great measure, to the discussions at these conventions.

The object, purposes, and management of the society are fully set forth in the following articles of association:

1. The name of the organization shall be the New York State Dairymen's Association and Board of Trade.
2. The officers of the association shall consist of a president, twenty vice-presidents, a secretary, treasurer, and six directors.
3. The president, secretary, treasurer, and directors shall constitute the executive board of the association, whose duty shall be to prepare and establish a plan for the government and operations of the association during each year, and who shall have the control of the business.
4. The officers of the association shall be elected at the regular annual meeting, and shall retain their officers for one year and until their successors are chosen.
5. The regular annual meeting shall occur at Little Falls, N. Y., on the third Monday of February of each year, at such place as the board shall provide. Due public notice shall be given in such newspapers as the executive board shall designate, for three weeks prior to the day of election.

6. During the summer and fall of each year regular meetings of the association shall be held for the discussion and transaction of business at Little Falls, at such time and place as the executive board shall indicate. One winter convention shall be had, commencing on the second Wednesday of December of each year, at such place in the State as shall be designated by the executive board.

7. The executive board shall provide a convenient room in the village of Little Falls, furniture and stationery for the transaction of business, and make suitable arrangements for telegraph reports of gold and produce markets on market days.

8. The executive board may appoint correspondents in other parts of the country and in Europe, who shall have the privileges of membership. It may also provide for the settlement of differences between the members by summary arbitration.

9. Any vacancies which may occur shall be filled during the unexpired term by the executive board.

10. Any person may become a member of the association, and be entitled to all its benefits, by signing the articles of association and by the payment of not less than $1 a year, or such greater sum as the executive board shall direct, for any succeeding year, not exceeding $5.

11. These articles of association may be amended at any annual meeting by a vote of two-thirds of the members present voting.

An elegant trade-room is fitted up and furnished at Little Falls, which is the business headquarters of the board. It is conveniently located, near the Central Railroad depot, and provided with black-boards, tables, and all the conveniences for business. Upon the black-boards are recorded the prices of cheese and butter in all the great marts of the world. The cable, freights, and metropolitan prices regulate the prices of cheese and butter at the time, and forms the basis of sales. On Monday of each week, from the 1st of April to the 1st of December, buyer and seller meet here and the transactions are made. The salesmen of one hundred or more factories come upon the market and are met by New York, Philadelphia, and London dealers, or their purchasing-agents. A large part of the transactions are made without a cheese being shown, the quality of the article being known to the buyer, either from examination at the factory or the general reputation of the establishment.

NATIONAL DAIRYMEN'S CLUB AND BOARD OF TRADE, UTICA, N. Y.

The National Dairymen's Board of Trade was organized in the city of Utica, N. Y., in February, 1871. The object of the organization was to promote the science and practice of dairy-husbandry, and to establish a regular market day and place where the buyers could meet the salesmen from the factories in the surrounding country, and accomplish trade in dairy-products. The officers elected in 1871 were as follows: T. O. Curtis, of Utica, president; Edward J. Wickson, of Utica, secretary; Dr. L. L. Night, of Whitestown, treasurer. The organization has prospered from the outset, and has grown in usefulness up to the present time.

The sale of dairy-products is held each Monday, from April until December, in the rooms of the board, in Bagg's Hotel, near the railway-station. During the first two years the amounts sold are not upon record. The summary of trade of the season of 1873 is as follows: There were offered for sale at the meetings of the board 207,773 boxes of cheese, weighing 12,466,380 pounds, with a money-value of $1,495,965.60.

During the season of 1874 there were offered 211,642 boxes of cheese, reaching a money-value of $1,777,692.80. The year 1875 brought a further growth to the transactions of the board. The value of the product sold exceeded $2,000,000.

The success of the plan of selling cheese thus inaugurated in Utica has led to the establishment of dairy boards of trade in nearly all the

dairy regions. The officers of the Utica board for 1875 were as follows: Edward J. Wickson, president; E. B. Ellis, secretary; Dr. L. L. Night, treasurer.

OHIO STATE HORTICULTURAL SOCIETY.

Under its former name, the "Ohio Pomological Society," this association claims to be among the oldest in the country. It dates from the meeting of the Ohio nurserymen and fruit-growers, in Columbus, during the month of August, 1847. That convention, previous to adjournment, resolved to meet again the following year, and for several years thereafter continued to hold annual meetings. In 1852, a formal organization was effected, under the name of "The Ohio Pomological Society," the constitution stating the object of the association to be "to collect, condense, and collate information relative to all varieties of fruit, and to dispense the same among the people." The officers elected were: A. H. Ernst, president; J. A. Warder, vice-president; F. R. Elliott, secretary; M. B. Bateham, secretary.

Ten years later, in 1862, Mr. Ernst, the president of the society, died, and Dr. J. A. Warder was elected to succeed him. This gentleman has continued to fill this position from that time until the present, with credit to himself and satisfaction to the association.

In 1867, it was deemed advisable to change the name of the society to that of "Ohio State Horticultural Society," and the object, as set forth in the revised constitution, is "to collect and disseminate information relative to fruits and other horticultural products, and to promote the taste for horticultural and rural embellishment among the people." The officers then elected were: J. A. Warder, president; G. W. Campbell, vice-president; M. B. Bateham, secretary and treasurer.

From that time until the present, the work and influence of the society have steadily increased. The annual meetings, which occur in December, are held in such places as the society may be invited. This gives an opportunity, in turn, for the members to visit different sections of the State. During the summer season meetings are also held for the purpose of inspecting orchards, vineyards, &c., while the different varieties of fruits are in their growing and ripening state. These gatherings are generally well attended, and excite much interest among the people of the section visited.

The annual reports of the society are published by the State as an appendix to the State agricultural report, and in pamphlet form, for the use of its members. In addition to this, an annual appropriation of $500 is made by the State to aid the society in defraying its necessary expenses. Members of the society, who now number about 200, pay an annual fee of $1.

The officers of the association for the current year are: J. A. Warder, president, Cincinnati; N. Ohmer, vice-president, Dayton; M. B. Bateham, secretary, Painesville; G. W. Campbell, treasurer, Delaware.

OHIO STATE WOOL-GROWERS' ASSOCIATION.

The organization of this association was effected at Cleveland, in 1863, by the adoption of a constitution providing for the election of a president, vice-president, secretary, treasurer, and three directors. At the first election, Mr. S. D. Harris, of the Ohio Farmer, was elected president, and W. F. Grier, secretary. Messrs. John Montgomery, N. S. Townshend, and Columbus Delano each served one term as president. In 1866, Mr. J. C. Stevens, of Kenton, Ohio, was elected president of

the association, and has continued to fill the position until the present time. During the existence of the society several distinguished agriculturists have filled the position of secretary, among them Mr. J. B. Jamison and Mr. John H. Klippart.

The annual convention, which meets in Columbus in the month of January, is usually well attended, not only by residents of the State, but by many interested in the objects of the association from remote sections of the country. Subjects pertaining to sheep-breeding and wool-growing are ably discussed at these meetings, and such action taken as will tend to advance the interest of wool-growers throughout the country.

This association made the first move toward perfecting the National Wool-Growers' Association, which was organized at Syracuse, N. Y., in 1864. The principal object of this national organization was to prevent unfavorable legislation by Congress touching the wool-interests of the United States. The Ohio association has effected much good in creating and fostering a spirit of enterprise and rivalry among farmers in the improvement of both the quality of sheep and quantity of wool grown. A more systematic attention has been given in summering and wintering, and the crossing with better grades, with a view to greater profit to the grower and manufacturer, and better satisfaction to the consumer. The Ohio association and Ohio wool have been represented at almost every important woolen exposition held in this country since its organization. A large space has already been assigned for the display of both sheep and wool, under the supervision of this society, at the approaching Centennial Exposition.

OREGON STATE AGRICULTURAL SOCIETY.

The Oregon State Agricultural Society was organized in 1861, and incorporated by act of the general assembly in 1870. At the time of incorporation there were one hundred and fifty-nine annual and fifty life members enrolled. Of late years the society has grown rapidly, and its work is being felt throughout every section of the State. Its annual exhibitions have been very successful. During the progress of the last one over twenty thousand people were in attendance.

The society publishes an annual report, which is freely distributed among the farming and producing classes of the State. Mr. E. M. Waite is the present secretary, and has his headquarters at Salem, the capital of the State. The society owns real estate and other property to the amount of $40,682.67.

OREGON STATE HORTICULTURAL SOCIETY.

This society was organized in the early part of the year 1870, and for a year or two was chiefly supported by a few of the leading fruit-growers of the State. Its membership is now quite large, and on its roll are numbered many prominent horticulturists of both the State of Oregon and Washington Territory. It has held two summer exhibitions in Portland and four autumn exhibitions at Salem, the State capital, all of which have proved satisfactory. The officers of the association for the current year are: Seth Snelling, president; A. R. Shipley, secretary; and J. R. Cardwell, treasurer.

The organization and operations of this society have given a new stimulus to fruit-growing in the State, which is evidenced in the planting of new orchards and the enlarging of many old ones. Several factories

for drying fruit have been established in different localities of the State, and the demand, at remunerative prices, has been even greater than the supply, especially for plums and prunes. No worms or insects of any kind infest or damage the fruit in this State.

PENNSYLVANIA STATE AGRICULTURAL SOCIETY.

On January 21, 1851, representatives from fifty-seven of the then fifty-nine counties of the State of Pennsylvania assembled at Harrisburgh for the purpose of forming an agricultural society. When the convention came together it was found that over two hundred of the leading agriculturists of the State were in attendance. Hon. George W. Woodward, afterward chief-justice of the State, was chosen chairman. Before the adjournment, Alexander L. Hayes reported a constitution, which was adopted. So well considered was the work of the convention, that all the operations of the society have since been conducted under it without any material alteration. Hon. Frederick Watts, since Commissioner of Agriculture, was chosen president of the society on the adoption of the constitution, and Robert C. Walker, now of Colorado, was elected secretary. On March 29, 1851, the society was incorporated by an act of the general assembly, under the name of the Pennsylvania State Agricultural Society.

The first fair and exhibition of the society was held in Harrisburgh, in October, 1852. Since then, exhibitions have been held in various parts of the State—in Lancaster, Philadelphia, Easton, Erie, Wyoming, Pittsburgh, Morristown, Scranton, and Williamsport, with varying success, yet always accomplishing something toward the development of the agricultural resources of the State. Its success has been uniformly progressive and substantial—observable, especially, in increased crops, and broader intelligence in the treatment of land and in general farm-improvements.

Many of the contrivances first exhibited under the auspices of this society are yet in use, and are both practical and economical. Yet, under the incentive of the liberal premiums offered by the society, vast improvements have been made in farm labor-saving machines, thereby dispensing with much of the hard and rugged work formerly attendant upon the cultivation of the soil. For this object it is estimated that the parent society alone has paid in premiums since its organization not less one hundred thousand dollars. If to this be added two hundred thousand dollars paid by the county and district associations, it will be seen that, during the past twenty years, near one-third of a million of dollars has been expended for the encouragement of the inventive genius of the State and of a better and more intelligent system of farm-husbandry.

The affairs of the society are conducted by an executive committee. This committee is appointed in January of each year, and consists of a president, and vice-president from each congressional district, five persons chosen from the State at large, all the ex-presidents of the society, two chemists, librarian, treasurer, corresponding and recording secretaries, in all forming a committee of about fifty persons, who are required to meet quarterly. A large majority of this committee is always in attendance, and all seem to take a deep interest in the affairs of the association and in pushing forward the good work of the society.

The following are the names of the gentlemen who have acted as presidents of the society since its organization: 1851 to 1855, Frederick Watts; 1855 to 1857, James Gowen; 1858 and 1859, David Taggart;

1859 to 1862, Jacob S. Haldeman; 1862 to 1865, Thomas P. Knox; 1865 to 1869, A. Boyd Hamilton; 1869 and 1870, Amos S. Knapp; 1870 to 1872, John Morris; 1872 to 1875, Jacob R. Ely; 1875 and 1876, George Scott. The recording secretaries have been as follows: Robert C. Walker, Augustus O. Heister, John H. Zeigler, A. Brower Longaker, and D. W. Seiler.

The recording secretary and treasurer are the only salaried officers of the society.

PENNSYLVANIA STATE HORTICULTURAL SOCIETY.

On November 24, 1827, nine gentlemen met at the Franklin Institute, in Philadelphia, for the purpose of considering the subject of the formation of a society for the promotion and advancement of the horticultural interests of the State. Mr. Matthew Carey presided, and it was resolved to found the Pennsylvania Horticultural Society. At a meeting held on the fourteenth day of the following month, a constitution and by-laws were adopted, and the first organization took place on the 22d of June, 1828, when the distinguished lawyer and horticulturist, Horace Binney, (lately deceased,) was elected president. Three members of this early council still survive in the persons of General Robert Patterson, Moses Brown, and David Landreth.

The first exhibition of the society was held on November 3, 1828, when Colonel Carr was the leading exhibitor, among other things exhibiting American wine of the native grape, which was highly praised.

On account of a proposed trip to Europe, Mr. Binney declined re-election, and the distinguished botanist, Zaccheus Collins, whose name is perpetuated in the pretty California genus of annuals, Collinsia, was elected president. The society at once became popular with the best citizens of Philadelphia, and on August 3, 1828, not less than sixty-five members were elected. In 1829, Joseph R. Ingersoll, another distinguished citizen, was elected to the presidency, and in 1831 George Vaux succeeded him. Numbers continued to join the society, often as many as fifty at a time.

In 1836, Horace Binney was again elected president, and subsequently Caleb Cope, General Patterson, Matthew W. Baldwin, J. E. Mitchell, Fairman Rogers, D. Rodney King, and W. L. Shaffer, who is the present incumbent.

Since the burning of the Chinese Museum, in which the meetings were held, the society had difficulty in keeping up its popular exhibitions, there being no hall in the city large enough to accommodate the display, and it was compelled to invest its means in what is now the horticultural hall, in Philadelphia, the largest hall in the city. It now holds two annual exhibitions, the leading one being in September, and opens its competitive premiums to the whole Union, irrespective of any entrance-fee. It has been re-organized in many respects, and is now of national reputation. A valuable library is owned by the society, but owing to the great growth of the city and the distance of the leading members from the center, it is not used as freely as formerly, and new additions have not been made to any extent of late years.

The present officers of the association are: W. L. Shaffer, president; A. W. Harrison, recording secretary and treasurer; Thomas Meehan, corresponding secretary.

SOUTH CAROLINA STATE AGRICULTURAL SOCIETY.

This society was founded in 1785, and incorporated in 1795. Its object was to institute a farm for agricultural experiments, to import and

circulate foreign articles suitable to the soil and climate of South Carolina, to direct the attention of the agriculturists of the State to useful objects, and to reward such as improved the art. Among its first acts was to import vines and olives. The vines failed, as it was supposed, on account of the moisture of the climate. The olives were considered a success at the time, but have since fallen into neglect.

About the year 1808 the society applied itself to rice-culture, and directed attention to the water system. It offered medals for the most successful experiments in the use of water for this purpose, for the best hydraulic-machine to raise water. It was supposed that the practice of the delta of Egypt could be introduced into the State, which would release the laborers on rice "cultivation for five of the best months in the year," and their labor could be bestowed on other objects, as water performed all the "necessary operations between sowing and reaping." At the same time the society offered medals for the best method of preventing injury by the caterpillar to the cotton-plant, and for the best method of "discharging stains from cotton, and rendering it perfectly white," and for "extracting oils from the ground-nut, benne, cotton and sunflower seeds, for certain cured roots and medicines, hops, madder, and dried figs, all to be raised in the State, and for the best flock of the true merino sheep."

The society early possessed itself of a tract of land near the city of Charleston. Agricultural experiments were continually made on this land up to the beginning of the late war. The society also, from time to time, gave premiums for improved stock. The general ruin following the war reduced the society's means, and it was compelled to rent out its experimental farm. Since 1870 it has annually held floral fairs for the purpose of attracting attention and gaining strength. These exhibitions have been useful in reviving and cultivating a taste for plants and flowers. The society is beginning again to interest itself in the general progress of agriculture in the State. The past season it directed the attention of agriculturists to the importance of the culture of jute and Irish potatoes, and for encouragement offered premiums of $100 on each of these articles.

Some years ago the membership of the society was very large, and distributed over every section of the State. It is quite small now, and a majority of them reside in the immediate vicinity of Charleston. By reducing the annual fee to $3 the number of members has been increased to about one hundred and fifty.

The business of the society is managed by an executive committee, which meets monthly, and reports quarterly to a general meeting. The anniversary was formerly held on the 24th of August, the date of its founding, but of late years, for convenience, it has been celebrated on the second Thursday in January.

The officers of the society for the current year are as follows: Dr. A. B. Rose, president; W. L. Trenholm, E. M. Clarke, W. G. Vardell, C. A. Chisholm, and Prof. F. S. Holmes, vice-presidents; A. Baron Holmes, secretary and treasurer; S. P. Ravenel, corresponding secretary.

TENNESSEE STATE HORTICULTURAL SOCIETY.

The Tennessee State Horticultural Society was chartered by the legislature in 1867. Its object is the promotion of the cultivation of fruits, flowers, and vegetables. The society holds regular monthly meetings in Nashville, and numbers on its roll two hundred and sixty-nine members. At these meetings essays are read on subjects relating to pom-

ology and kindred sciences, which are usually followed by discussions of a profitable nature. During the proper seasons, specimens of fruits, flowers, and vegetables are also exhibited, and form a very interesting feature of the meetings. Much encouragement has been given to the cultivation of a knowledge of the habits of insects by the establishment of a professorship of entomology.

For a number of years the society held annual exhibitions, which were largely attended, and at each of which $1,000 were distributed in premiums. These exhibitions were usually successful, both in the quality of the products exhibited and the number of articles displayed, but, in order to interest a still larger proportion of the people of the State, the society, in 1871, united with the Nashville Board of Trade, the Mechanics' Association, and a number of leading business men, for the purpose of erecting an exposition building, in which to hold annual displays of all the various products of the State. These exhibitions were held for three successive years, and in a financial point of view were very successful, yielding about $20,000 per annum; in this short time nearly balancing the original cost of the buildings. An accident which occurred to the building during a severe storm, and the extreme pressure in the money market, prevented an exposition in 1875.

The following are the names of the officers of the society for the current year: Rev. P. S. Fall, D. D., president; D. F. Wilkin, vice-president; J. H. Hamilton, treasurer; George S. Blackie, M. D., Ph. D., treasurer.

VERMONT STATE BOARD OF AGRICULTURE.

The organization of the Vermont State Board of Agriculture, Manufactures, and Mining was completed by the election of Prof. Peter Collier as secretary, at a meeting held in Burlington, Vt., January 19, 1871. The act of incorporation, passed November 22, 1870, provides that the board shall consist of the governor, the president of the State agricultural college, and six other persons, who shall be nominated by the governor and confirmed by the senate.

At a meeting of the board, held February 9, 1871, Professor Collier presented a paper in which the following details of work for the board were marked out:

1. To supplement other organizations for similar purposes, but to supplant nothing.
2. To co-operate with county and town societies, and through them secure some uniform and systematic plan of work throughout the State.
3. To suggest to dairymen, farmers, and stock-breeders certain definite experimental problems.
4. To procure analyses of fertilizers (natural or artificial) on sale throughout the State, and publish them in full, with their relative and commercial values; and to secure protection against frauds by legislative or other action.
5. To hold at least one annual meeting, at some central point in the State, for the purpose of discussion and the reading of papers.
6. Under the auspicies of the local societies, and co-operating with them, to hold meetings of the board from time to time, in the various counties, of the same general character as the State meetings.
7. To publish from time to time the more valuable papers presented, together with statistics collected, and distribute the same among the people separately or in the annual report.
8. Gathering statistics as to the various mining operations and metallurgical industries of the State—chiefly in marble, granite, soap-stone, slate, copper, and iron, and comparing our own resources with those of other sections of the country as to extent and profit.
9. Calling attention to ores and deposits occuring in the State, whether utilized at present or not.
10. Especially in those sections where these interests are important, to prepare papers and discussions calling attention to the kinds of ores in the vicinity, their metallurgical or economic value, and the methods of readily testing them.

11. Gathering information and statistics as to the various kinds of manufactures, their extent and prosperity.
12. Collection of statistics as to the water-power of the State, occupied and unoccupied, and its accessibility.
13. Calling attention to supplies of raw and waste material in the State which is unused.
14. Inquiring into the best method of promoting manufactures, without imperiling other public interests.

The board proceeded to carry out these suggestions with great vigor, and the result has been a series of annual reports which rank among the ablest rural publications issued by any similar organization in the country. The meetings of the board in various localities, and the discussions which have followed, (all of which are given in the annual reports,) have awakened renewed interest among the farming and producing classes in their respective callings, and the results are apparent in an improved condition of the farming and manufacturing interests of the State.

VERMONT DAIRYMEN'S ASSOCIATION.

This association was organized October 28, 1869. Its object, as defined in the constitution, is "to improve the dairy interests of Vermont, and all subsidiary interests." It is composed of annual members, who become such on the payment of $2, and who receive the printed transactions for the current year; life-members, who pay $5 and receive full sets of the printed transactions; also of honorary and corresponding members who are elected by the association. Its officers are a president, three district vice-presidents, a secretary, treasurer, and forty-two county trustees. The president, vice-presidents, and secretary, (who also acts as treasurer,) constitute the executive committee. The association holds an annual meeting for the election of officers and the transaction of business on the second Wednesday after the second Thursday in October, and a winter meeting of three days for the reading of addresses, essays, &c., and the discussion of topics pertaining to its objects, beginning on the second Wednesday after the second Tuesday in January of each year.

The association has never made any special effort in behalf of an exhibition of dairy products or dairy requisites, yet a creditable display of both have been exhibited at the winter meetings.

The society owes its origin to a conviction on the part of a few of the leading dairymen of the State that the enviable reputation which the dairy products of Vermont have long enjoyed in all the markets of the country was liable to be sacrificed through the indifference of her dairymen to the tremendous efforts at improvement which were being made by her less favored neighbors. The impression seemed to have obtained that the prestige already enjoyed was sufficient without any further effort at advancement or enterprise on their part. From the first, the association has realized the most sanguine hopes of its promoters. At its inception it secured the most active co-operation and support of the leading dairymen and dairy authorities of the country, and, consequently, its influence has been wide-spread and healthful, manifesting itself in the improved breeding and feeding of dairy-stock, and the increased quantity and improved quality of the entire dairy-products of the State. Nor has its good influence been confined alone to the State of Vermont, as many citizens of other States are enrolled among its members and attend its meetings. Its published transactions have been sought by those interested in dairy productions in almost every section of this and in many foreign countries. Not the least of the many benefits of the association is the opportunity it has afforded

of bringing face to face many of the active promoters of agricultural and dairy reform from various, and in some cases remote, sections of the country, thus enabling them to compare experiences and institute new investigations.

In its earlier history the association often lacked the necessary funds for the printing of its transactions in permanent form, and for other necessary purposes, and these expenses bore quite heavily upon some of its more liberal members. For the past few years the State has assumed and paid the expenses attending the publication of these transactions, taking four hundred copies for its own use.

The capabilities and facilities of the association are greater at the present than at any former period of its history, and there would seem to be a wide field of usefulness before it. It has at this time 275 life-members, including about 20 honorary and the same number of corresponding members. Mr. Edwin D. Mason, of Richmond, Vt., has been president, and Mr. O. S. Bliss, of Georgia, Vt., has been secretary of the association from its organization down to the present time.

WISCONSIN STATE AGRICULTURAL SOCIETY.

The preliminary steps for the organization of this society were taken March 8, 1851, at a meeting held in the assembly chamber, at Madison, and composed of members of the legislature, leading farmers and stock-raisers, and other prominent citizens of the State. The meeting was organized by the election of Mr. William F. Tompkins as chairman, and Albert C. Ingham as secretary. Resolutions were presented and adopted, stating, in substance, that it was deemed expedient to organize a society for the promotion of agriculture, manufactures, and other industrial interests of the State. A committee, consisting of the following-named gentlemen, was appointed to draught a constitution and by-laws, and to present the names of suitable persons to fill the offices of the society, viz: Messrs. Henry Johnson, Adam E. Ray, Erastus W. Drury, Timothy Burns, Chauncy Abbott, Abram Ogden, and Royal Buck. The meeting then adjourned to March 12, 1851, at which date it again convened and permanently organized by the election of officers and the adoption of a constitution and by-laws.

The first annual fair of the society was held in Janesville the first week in October, 1851, and, under the circumstances, the association being without funds, was regarded as a great triumph by those who had inaugurated the enterprise. The entries numbered four hundred and sixty-one. No premiums were offered, as it was uncertain what would be realized from membership fees and receipts of the fair, these being at that time the only sources of revenue. Small premiums were, however, to the amount of $140, paid in diplomas and cash. In 1860, the society paid in premiums the sum of $2,826, and in 1875 nearly $10,000 in cash, besides silver medals and diplomas aggregating about $400 in value.

The number of life-members in 1851 was five; the number in 1875 is over seven hundred, composed of representative men engaged in all the various industrial interests of the State.

Annual fairs have been held since the organization of the society, except in 1861, 1862, and 1863. These exhibitions have done much to stimulate and encourage agriculture and the other industrial interests. They have been great public educators of the people, especially the producing-classes, stimulating and encouraging competition among them, and causing a spirit of emulation and friendly rivalry which has tended largely to the progress and advancement of the best interests of the State.

For four years past the society has annually held an agricultural convention at the capital of the State, composed of members of the legislature, representatives of district, county, and other industrial societies, including township clubs and granges, and the leading educators and practical agriculturists and producers of the State. At these gatherings essays upon practical industrial subjects are read and discussed, also topics relating to social science and political economy, making them very interesting and profitable meetings.

The fostering care of the State has been bestowed upon the associations by placing at its disposal elegant and commodious rooms in the capitol building. They are used for a library and museum room, and secretary's office. It also has donated to the society from $200 to $3,000 per annum, as its needs seemed to require, giving annually the last few years $2,000, besides printing five thousand copies of five hundred pages each of the annual report of the secretary.

The names of those who have filled the various offices of the association, from its inception, are as follows:

1851.—Erastus W. Drury, president; Albert C. Ingham, secretary; Chauncy Abbott, treasurer. 1852.—Henry M. Billings, president; Albert C. Ingham, secretary; Simeon Mills, treasurer. 1853.—E. W. Edgeston, president; Albert C. Ingham, secretary; Samuel Marshall, treasurer. 1854.—E. W. Edgeston, president; Albert C. Ingham, secretary; Samuel Marshall, treasurer. 1855.—E. W. Edgeston, president; George O. Tiffany, secretary; Samuel Marshall, treasurer. 1856.—Harvey Dunkee, president; George O. Tiffany, secretary; D. J. Powers, treasurer. 1857.—J. F. Willard, president; George O. Tiffany, secretary; D. J. Powers, treasurer. 1858 and 1859.—J. F. Willard, president; D. J. Powers, secretary; Daniel Atwood, treasurer. 1860 to 1864.—B. R. Hinkley, president; J. W. Hoyt, secretary; Daniel Atwood, treasurer. 1865 and 1866.—David Williams, president; J. W. Hoyt, secretary; Daniel Atwood, treasurer. 1867 and 1868.—K. A. Darling, president; J. W. Hoyt, secretary; Daniel Atwood, treasurer. 1869 and 1870.—B. R. Hinkley, president; J. W. Hoyt, secretary; Daniel Atwood, treasurer. 1871.—B. R. Hinkley, president; J. W. Hoyt, secretary; Harrison Ludington, treasurer. 1872.—B. R. Hinkley, president; W. W. Field, secretary; Harrison Ludington, treasurer. 1873.—W. R. Taylor, president; W. W. Field, secretary; F. J. Blair, treasurer. 1874 to 1876.—Eli Stilson, president; W. W. Field, secretary; F. J. Blair, treasurer.

WEST VIRGINIA CENTRAL AGRICULTURAL AND MECHANICAL SOCIETY.

This society was organized at Clarksburgh, W. Va., July 26, 1867. It was organized on the principle of a stock company, and has since continued to work under this system. It has held nine annual fairs, all of which have been well attended. At a majority of these exhibitions the display of stock and farming and mechanical implements has been very creditable. The labors of the association seems to have had a good influence in awakening renewed interest in the development of the industrial interests of the State.

Mr. Richard T. Lowndes was elected as the first president of the association, and was continued as such for six years in succession. He was succeeded by Mr. Samuel R. Steel, who served for one year, when the present incumbent, Mr. Lee Haymond, was called to the chair. Mr. Luther Haymond was the first corresponding secretary of the society, and has been continued as such since its organization.

PROGRESS OF INDUSTRIAL EDUCATION.

No industrial colleges with congressional endowment have been established during the year. In thirty-six States there are thirty-nine independent colleges, and two others, the North Georgia Agricultural College and the Missouri School of Mines and Metallurgy, located at a distance from their parent universities. The North Carolina College of Agriculture and the Mechanic Arts has been opened since our last report. Those of Florida and Texas are still inoperative. All the States, except Nevada, have established industrial colleges, agreeably to the requirement of Congress by the act of July 2, 1862. The number of professors and assistants employed in them is 463; students in attendance, 3,703; graduates during the collegiate year in agricultural or mechanical studies, 382; graduates since the colleges received the congressional land-scrip, 1,524. The increase of professors and assistants over those of the last year is 28; of students, 34. There are only eleven States which have not sold all their scrip or land. Of these, Nebraska and Nevada have sold none. During the year eight States, Iowa, Kansas, Michigan, Minnesota, Missouri, New York, Oregon, and Wisconsin, have sold 41,285 acres, at an average price of $3.27 per acre. Illinois has sold none this year. The largest average price per acre obtained by any State is $6.25, by Kansas; the smallest, $1.15, by Wisconsin. The number of acres remaining unsold by the several States is 1,513,671.*

A large amount of thorough work has been done by many of the colleges during the year. The older institutions appear to have settled down upon a fixed policy of requiring of their students a thorough scientific and practical education in the principles of agriculture and the mechanic arts. The prevalent idea seems to be, that it is better to educate a few thoroughly than many superficially, with the belief that those thus educated will diffuse agricultural intelligence among the farmers around them. For those who can devote only a short time to study, a brief course has been prepared by some of the colleges, in which instruction is given during only a few months in the year. Quite a number of the colleges recently established appear to be in a transition state. Sweeping changes have been made in the faculties, and in some instances the courses of study have been very much modified. These colleges will, no doubt, soon come into a more permanent condition. Additional statistical information may be found in the table at the close of this article.

ALABAMA.

Agricultural and Mechanical College of Alabama, at Auburn, Rev. I. T. Tichenor, D. D., president.—No material change has been made in the college during the year. It now has nominally an annual income from the national endowment fund of $20,230, but it is paid in State certificates on which there is, on an average, a discount of about 20 per cent; so that the college really receives only a little more than $16,000. Chemical apparatus to the amount of $500 has been purchased. The college farm has been much improved by ditching, underdraining, and

* In the tabular estimate made of the college lands remaining unsold last year, those of New York were not included, the quantity not then being known. The estimate, therefore, for that year appears smaller than for this, in which they are included. None are omitted in the present estimate.

subsoiling. The college has the use of another farm which is employed as an experimental station. It is located in the northern part of the State, in the valley of the Tennessee River, near Cortland, in Lawrence County, about two hundred miles from the college. It is intended to procure the use of other farms in different parts of the State for the same purpose as soon as the agricultural community demand it, and the means of the college will permit.

The farm near the college is used as a model farm, on which lessons are given to students and the farming community in improved modes of culture, in the use of good farm implements, fertilizers, and a proper rotation of crops. In the present condition of agriculture in the State, practical instruction is deemed more important than experimentation. Wheat, oats, corn, sugar-cane, cotton, German millet, grasses of different kinds, lucern, sweet-potatoes, onions, and a great variety of garden-vegetables have been cultivated on this farm. The turnip crop yielded at the rate of 46 tons per acre. The other farm, called the experimental station, near Cortland, is under the superintendence of Hon. J. J. Barclay. Elaborate experiments have been conducted in the culture of cotton, in which different fertilizers were employed to test their effects on the crop, and to ascertain the elements of fertility needed in the soil of the farm to insure the greatest product. Bat-guano, obtained from caves frequented by bats, was used with marked success. Satisfactory experiments were also made with corn, and in subsoiling.

Special care is taken in the agricultural course that every branch of study shall receive a proper share of attention by the students, but agricultural chemistry and botany are made the most prominent. The recitations of the students are marked daily on a scale ranging from 0 to 100. If the yearly average of scholarship of any student falls below 75 he is not permitted to pass to the next higher class, and is declared deficient in progress; if the yearly average in any particular study falls below 65 he is required to pass a second examination in that study at the beginning of the next session, before he can enter the higher class of the next year.

The college has 6 professors and 2 assistants; number of students during the collegiate year 88, 27 of whom pursue agricultural and 22 mechanical studies; graduates 4; graduates since the college received the congressional land-grant, 16.

ARKANSAS.

Arkansas Industrial University, at Fayetteville, N. P. Gates, A. M. president.—Some changes have been made in the faculty of the university. N. P. Gates, A. M., has been elected president in place of General Albert W. Bishop, A. M., resigned, and F. L. Harvey, professor of chemistry, in place of T. L. Thompson, B. S., deceased. The university building, represented last year as in course of construction, is now completed. It is an elegant and substantial edifice, and of sufficient size to accommodate all the departments. The old building is used for a chemical and physical laboratory. The State legislature, at its last session, appropriated $1,500 for apparatus for the chemical and $600 for the physical laboratory; also, $800 for the library.

There were raised, the past season, on the farm 400 bushels of corn, 12 of sweet-potatoes, 140 of choice apples, 30 of peaches, and 300 heads of cabbages. Oats and grass were a failure. No stock is kept except what is needed for performing the farm work. Although labor of students is not compulsory, they did all the work on the farm during

the crop season, and would have done more if it could have been furnished them. Regular courses of lectures have been delivered to the students on mechanical and chemical treatment of soils, draining, the nature and special uses of manures, different kinds of farm implements and their uses, varieties and culture of cereals, varieties of fruits and their propagation, breeds of stock, and principles of breeding.

The university has 8 professors and 3 assistants. The number of students during the collegiate year is 248. The agricultural department has 1 professor who devotes all his time, and 7 others who devote a part, to instruction in agriculture and related branches. There are 9 students who are pursuing the regular course in agriculture, and several others attend lectures on the subject.

CALIFORNIA.

University of California—Colleges of Science, at Berkeley, John Le Conte, M. D., president.—Some changes have occurred in the faculty of the university. John Le Conte, M. D., has been appointed president, in place of Daniel C. Gilman, A. M., resigned; Frederick G. Hesse, formerly professor of mathematics in the United States Navy, professor of industrial mechanics; George F. Becker, Ph. D., lecturer on metallurgy; Edward A. Parker, B. S., assistant instructor and lecturer on mechanics; and John W. Bice, B. S., assistant instructor in engineering. Seven colleges are now organized in the university: The colleges of letters, agriculture, mechanics, mining, engineering, chemistry, and medicine. They are all located at Berkeley, except the college of medicine, which is at San Francisco, about twelve miles distant. A fine building in San Francisco has been presented to the university for the use of this college. It is called "Toland Hall," in honor of the donor, Dr. H. H. Toland.

The experimental farm, including the site of the university, contains 200 acres, much diversified in surface, and adapted to a great variety of culture. Only a small part of it has been brought into a proper condition for experimentation with crops, and no live-stock is at present kept upon it. A large amount of work has been done during the year in horticulture. In the propagating houses, one of which is 20 by 30 feet and the other 15 by 64 feet, there have been produced 10,000 eucalyptus plants of 20 species; 5,000 acacias of 25 species; 200 species of native and foreign conifers; also, numerous rare forms peculiar to Australia, South and Central America, and elsewhere, and many species of textile, medicinal, and other economic plants, besides 112 varieties of roses, 13 of azalias, 12 of camellias, and 6 of magnolias, for ornamental purposes. In the orchard, there have been planted 141 varieties of apples, 14 of Siberian crab-apples, 82 of cherries, 57 of plums, 89 of peaches, 22 of apricots, 2 of quinces, 15 of nectarines, 73 of grapes, 7 of blackberries, 8 of gooseberries, 8 of currants, 34 of raspberries, 35 of strawberries, 3 of filberts, 1 of asparagus, 16 of rhubarb, 6 of mulberries, and all the species of walnuts, besides many varieties of oranges, lemons, and limes. Among the apples are 9 new Russian varieties, and among the peaches 17 of Rivers's new seedlings.

The instruction in the different departments of the university is extensive and thorough. Economic botany and agricultural chemistry are made the most prominent studies in the agricultural course. In addition to the strictly agricultural lectures, others have been given on the use of the barometer in the determination of heights, as employed in California and the Rocky Mountains; coal as a raw material; the Rocky

Mountains; the Sierra Nevada; the physical geography of the Eastern States; and modern glaciers. The English language is thoroughly studied under three divisions—its structure and history; the literature in its past productions and current progress; and the attainment of practical skill in its use, or what may be included under composition, rhetoric, and criticism. This plan of study is continued through the entire four years' course. The chemical laboratory and the philosophical apparatus are very complete. The room of quantitative analysis will afford accommodations for thirty-two students to work at one time, and that of qualitative analysis, for twenty. Among the philosophical apparatus may be mentioned Melloni's apparatus for demonstrating the laws of radiant heat; Holtz's electrical machine; Coulomb's torsion balance; Geissler's tubes; Lyman's apparatus for water-waves; Snell's, for sound-waves; Powell's, for light-waves; Young's, for interference-waves; and Dubosq's spectroscope and electrical-light apparatus.

The university, including all the departments, has 15 professors and 19 assistants; the colleges of science, which include the colleges of agriculture, mechanics, engineering, mining, and chemistry, 13 professors and 14 assistants. The number of students in the university for the collegiate year is 231, 85 of whom are in the colleges of science. The number of graduates for the collegiate year in the colleges of agriculture, mechanics, and engineering is 13; the number since they received the congressional land-grant is 32.

CONNECTICUT.

Yale College—Sheffield Scientific School at New Haven, Rev. Noah Porter, D. D., LL.D., president.—It is ten years since this school received the endowment of the congressional land-grant, and the number of students is now nearly three times as great as when the first report of its condition was published. Since that time 284 students have graduated, 75 of whom occupy positions of responsibility as professors in connection with colleges in different parts of our country. Prof. Samuel W. Johnson has made an able report, published in the tenth annual report of this school, on the agricultural experiment-stations of Europe, and their adaptability to the wants of the farmers of Connecticut and of our country generally, the result of which appears to have been the establishment of the Connecticut experiment-station, at Middletown, in connection with the Wesleyan University. He says there are now seventy of these stations in Europe, each of which employs one to five investigators, who have been trained in the great modern schools of chemistry and physiology. Some thirteen of these stations are chiefly devoted to the study of cattle-feeding; some twenty-five to experiments on the conditions of vegetable growth and the action of manures; others to tobacco, grape-culture, wine-making, silk-production, and the milk-industry; thirty are largely occupied with analyses of commercial manures and eighteen in testing the purity and vitality of seeds.

The most important movement of the year for the benefit of this school is the commencement of a fine building for the Peabody Museum of Natural History, which will be completed some time in 1876. It will add largely to the facilities for instruction in this school, in consequence of the vast collections and laboratories to be deposited in it when completed. Large additions have been made to the zoölogical department, consisting largely of marine invertebrates, collected in connection with the explorations under Prof. S. F. Baird, United States Commissioner of Fishes and Fisheries. Also, the geological de-

partment has been much increased. Twelve parties were employed in the West during the summer and autumn months in making collections, and many thousand specimens of Cretaceous and Tertiary vertibrate fossils were obtained, many of which are new to science. One of the most interesting specimens added to the museum is a nearly complete skeleton of the *Mastodon Americanus*, found by Mr. Andrew Mitchell on his farm in Otisville, Orange County, New York. This skeleton belonged to a fully adult animal, and is in better preservation than any yet discovered in this country. A powerful electro-magnet, with auxiliary apparatus, has been presented to the school by its manufacturer, Mr. William Wallace, the lifting-force of which is estimated at eleven tons.

The scientific school has 16 professors and 13 assistants; students during the collegiate year, 224; graduates, 55; since it received the congressional land-grant, 284. The college, in all the departments, 48 professors, 41 assistants, and 1,051 students.

DELAWARE.

Delaware College, at Newark, William H. Purnell, LL.D., president.—The usual amount of literary labor has been performed by the college during the year. Experiments have been conducted on the farm in testing the value of different fertilizers, field and garden seeds, Ville's system of mineral manures, and the improvement of breeds of sheep, swine, and poultry. There have been raised on the college-farm 30,000 heads of cabbages, 15,000 heads of celery, 600 bushels of turnips, 400 of rutabagas, 460 of mangel-wurzels and sugar-beets, 50 of currants, 50 of gooseberries, 3 tons of Concord grapes, and 20 tons of hay. Also, $250 worth of live stock, $450 worth of butter, and $1,200 of miscellaneous garden products, &c., have been sold. The domestic animals kept on the farm are Alderney grade cows, Chester-white and Berkshire hogs, Bronze turkeys, White-Leghorn and Brahma fowls. The Alderney cows and their grades are preferred for butter, Short-horns for beef, Ayrshires for milk, Chester-white hogs for pork, White-Leghorn fowls for eggs, and light Brahmas for the table.

Fruit-growing, market-gardening, dairy-management, fertilizers, (their composition and economical application,) civil engineering, analysis of soils, ores, and fertilizers, are made prominent branches of instruction in the agricultural and mechanical courses of study. A series of lectures has been given on a large number of subjects connected with agriculture. A prize of $25 is offered by the alumni association to the member of the senior class who shall attain the highest grade in the studies of the class during the collegiate year 1875–'76. The most pressing want of the college at the present time is a greater income. Only $5,000 per annum are available for the payment of six men to conduct the college, the experimental farm, and to make original investigations on crops.

The college has 5 professors, 1 adjunct professor, 1 instructor, and 1 lecturer. The number of students for the collegiate year is 42, 17 of whom are pursuing agricultural or mechanical studies; graduates, 12; since the college received the congressional land-grant, 22.

FLORIDA.

Florida State Agricultural College, Brevard County, Hon. William Watkin Hicks, president.—During the year the Florida State Agricultural College has been located in Brevard County, on Indian River, near the

mouth of Eau Gallie Creek, and about six miles east of Lake Washington, the headwaters of the Saint John's River. The location presents a fine view of the Atlantic Ocean across the Indian River, and is admirably adapted to the cultivation of all semi-tropical and of most tropical plants, being below the so-called "frost-line." A substantial college building, 62 feet long, 32 wide, two stories high, and containing 10 rooms, has been erected. It is built of coquina rock, a kind of limestone, composed principally of fragments of shells, cemented together by infiltration of lime-water. It is durable, and much used for building in Florida. The building will be ready for occupancy some time in 1876, and opened for the reception of students as soon as possible after its completion. The faculty of the college has not yet been appointed, but a selection will be made at an early date. The superintendent of public instruction of the State, Hon. William Watkin Hicks, is, by law, *ex officio* president of the trustees and also of the college, until a permanent president shall be elected.

GEORGIA.

University of Georgia—Georgia State College of Agriculture and the Mechanic Arts, at Athens, Rev. Henry H. Tucker, D. D., chancellor of the university; L. H. Charbonnier, A. M., president of the college.—Some changes have been made in the faculty of the university and college during the year. Rev. A. A. Lipscomb, D. D., LL.D., has resigned his position as chancellor, and been succeeded by Rev. Henry H. Tucker, D. D. Dr. Le Roy Brown has been elected professor of natural philosophy and astronomy in the university, and L. H. Charbonnier, A. M., has taken his place as president of the college of agriculture and the mechanic arts. Also, Mr. W. W. Lumpkin has been appointed professor of English. The State legislature, at its last session, made an appropriation of $15,000, payable in three yearly installments of $5,000 each, for the purpose of furnishing with apparatus the new laboratory building, which was completed last year through the liberality of the citizens of Athens. The first payment has already been made and expended for the purchase of such apparatus as the present wants of the laboratory require. A course of lectures has been given, embracing philosophy, meteorology, chemistry, agriculture, applied agriculture, horticulture, agricultural chemistry, and engineering.

Various interesting experiments have been made by the professor of chemistry on cattle-foods and fertilizers. He claims to have discovered the fact that phosphoric acid is the only mineral element needed on the soils of Middle Georgia, and that when applied in excess in the soluble form the first year, it will be held in solution for two or three years or more, until exhausted, paying, in the mean time, a good percentage on cotton production without additional application. Twelve acres of the college-farm are under cultivation, and used only to elucidate the principles of agriculture taught in the recitation-room. There have been raised on this land the present year 1,300 pounds of cotton, 2,600 pounds of cotton-seed, 40 bushels of Indian corn, 2,200 pounds of corn-fodder, 50 bushels of oats, and small quantities of wheat, pease, and turnips.

The college of agriculture and the mechanic arts has 6 professors and 3 assistants; during the collegiate year 86 students were enrolled and 7 graduates; making, since it received the congressional land-grant, 26 graduates; the university, in all the departments at Athens, has 13 professors, 4 assistants, and 229 students; including the department of

North Georgia Agricultural College, at Dahlonega, 17 professors, 5 assistants, and 487 students.

North Georgia Agricultural College, (a department of the preceding university,) at Dahlonega, Hon. David W. Lewis, A. M., president.—The general assembly of the State, at its last session, appropriated $3,000 for repairs on the college building and the purchase of apparatus. The roof of the building has been covered with a neat and substantial tin roof, the walls outside with mastic, and the recitation-rooms repaired and painted, at an expense of $1,813. Desks and seats for 200 students have been furnished for the school-rooms, costing $649, and chemical, philosophical, and astronomical apparatus to the amount of $327. It has also received a valuable set of surveyor's instruments, with recent improvements, being a donation from Col. N. H. Hand, of Cleveland, Ohio. The college building is believed to be one of the most attractive edifices for school purposes in the State.

Since the opening of this college forty teachers have been sent out, who are now employed as instructors in the public schools of the State. The number of students now resorting to it for instruction is increasing so rapidly that suitable accommodations for boarding can not be found, and new cottages or a boarding-hall must soon be erected or the work of the college will be very much impeded. The income of the college, $2,500 from the congressional land-grant and $450 received this year from the Peabody fund, is not adequate to the payment of a sufficient number of professors to perform the work required, and State aid must be given or the college will fail to accomplish the objects desired.

The college has 4 professors and 1 assistant. The number of students for the collegiate year is 258, 83 of whom are females. We are not able to give the number pursuing agricultural or mechanical studies, not having succeeded in getting a full report of the condition of the college.

ILLINOIS.

Illinois Industrial University, at Urbana, John M. Gregory, LL. D., regent.—Some changes have been made in the faculty during the year. Dr. M. Miles has been appointed professor of agriculture and instructor in agricultural chemistry, and Mr. C. W. Silver has resigned. A new veterinary hospital, with a dissecting-room, has been erected, and large additions have been made to the physical apparatus, especially in optics, electricity, mechanics, and models in architecture. Experiments have been conducted on the experimental farm with wheat, oats, corn, fermented corn-fodder, and fermented broom-corn seed, for winter feeding, and in variations in temperature of soils. There have been raised on the farm 6,820 bushels of corn, 300 of potatoes, 200 of beets, 400 of wheat, 256 of rye, 300 of oats, 65 of Hungarian grass-seed, and 124 tons of hay. Jersey, Devon, and Short-horn cattle, and Berkshire and Poland-China swine are kept on the farm. Short-horn cattle are preferred for beef, and Berkshire swine for pork.

Chemistry, breeding of domestic animals, principles of drainage, practical and experimental agriculture, including the subject of manures, crop-rotations, feeding of animals, management of soils, cultivation of special crops, zoölogy, animal physiology, veterinary principles, botany, principles of mechanism, mechanical laboratory practice, strength of materials, thermo-dynamics, prime movers, mill-work, and drawing as practiced in the best machine-factories, are made especially prominent in the courses of study and lectures. Investigations have been made

upon verbena-mold, and the "cutting-bench fungus," and important facts are believed to have been developed. A new tool, called the odontograph, has been invented for laying out gear-teeth. It consists of a logarithmic spiral, placed in position by the aid of a table, which thus forms very nearly the epicycloidal curve for the faces of gear-teeth. The most pressing wants of the university, at present, are increased funds for teaching-force and apparatus, and for making more extensive and scientific experiments. None of the congressional land-grant has been sold during the year.

The university has 12 professors and 12 assistants, some of whom are wholly and others partly engaged in giving instruction in agricultural and mechanical studies. The number of students during the collegiate year is 374, of whom 285 are gentlemen and 89 ladies. All the students pursue scientific studies. In the course of agriculture, there are 52; of mechanical engineering, 33; of civil engineering, 33; and of architecture, 15. Thirty-one graduated this year, making 82 since the university received the congressional land-grant.

INDIANA.

Purdue University—Indiana Agricultural College, at La Fayette, Abraham C. Shortridge, president.—The State legislature at its last session appropriated $8,000 to the university for improvements on the college-farm, and the purchase of farm-stock; $2,000 for additions to the library; and $10,000 for chemical and philosophical apparatus, making a total of $20,000. All the appropriation for the library has been expended. Of the $10,000 appropriated for apparatus, the departments of chemistry and physics have each expended $1,000, and the sum of $1,000 has been paid for a first-class compound microscope, purchased in London. The chemical and physical apparatus is extensive, and embraces patterns of the most recent construction. About $7,000 remain for additional purchases.

Short-horn and Alderney cattle and Berkshire hogs are kept on the farm. The common farm-crops—corn, wheat, oats, and grass—have been cultivated, but no experiments have been made. In the college, chemistry receives the largest share of attention. Besides the regular four years' course of study in agriculture, a special course, occupying two years, has been prepared for the accommodation of older students, or those who cannot afford the time to complete the longer course. In the shorter course an attempt has been made to lay a good foundation for practical training in agriculture and horticulture. Agriculture is one of the great aims of the university. It is placed on a level with architecture, engineering, and other departments of instruction. While the course is eminently practical and not merely theoretical, it is also elevated; so that when the student graduates in the regular four years' course he will be as highly educated as those of any other department of the university.

President Shortridge resigned his office at the close of the year, and Hon. E. E. White has been elected his successor. The university has 6 professors and 1 assistant professor. This faculty gives instruction in all the departments. The number of students in the university, including all the departments, during the collegiate year, is 57. So short a time has elapsed since the opening of the university that no students have made sufficient attainments to enable them to enter upon the regular courses of study in agriculture and the mechanic arts.

IOWA.

Iowa State Agricultural College, at Ames, A. S. Welch, LL.D., president.—Investigations have been made during the year by the botanist, Prof. C. E. Bessey, upon the growth of fungi, and the best methods of destroying them, and some new facts are believed to have been developed. Original drawings of grain-smut, Indian-corn smut, and their spores have also been made. Experiments have been conducted in feeding swine, and in the cultivation of potatoes, tomatoes, strawberries, raspberries, grapes, and beans, details of which, with the botanical drawings, may be found in the sixth biennial report of the college, for 1874–'75. There have been raised on the farm 3,669 bushels of corn, 1,300 of oats, 287 of rye, 100 of potatoes, 27 tons of roots, and 127 tons of hay. Five men were employed on the farm during the summer, besides the usual amount of labor performed by the students, who work two and a half hours daily. The breeds of cattle kept on the farm consist of the Short-horn, Ayrshire, Jersey, and grade, 73 in number; of sheep, Cotswold, Merino, Southdown, and grade, 88; of hogs, Poland-China and Berkshire, 104. The Berkshire is considered by the college the best breed for Iowa. Number of horses and mules, 17.

Courses of lectures are delivered to students on stock-breeding, horticulture, forestry, economic botany, and landscape-gardening. Particular attention is given to parasitic fungi, and the remedies and means for preventing their ravages are carefully examined. Horticulture and forestry are thoroughly taught by lectures in the class-room and in the field, in the presence of the objects to be studied, and with daily practice in all the manipulations of the work of the gardens, nurseries, orchards, forestry plantations, flower-borders, hedges, and ornamental grounds. During the year, in the nurseries 1,200 new forest-seedlings have been produced, and 500 apple-grafts have been made by the students in pomology. In the orchards, additions have been made to the area and to the varieties of apples, while one entire orchard of pears, cherries, and apples has been planted. The orchards now contain 80 varieties of apples, 6 of cherries, 2 of plums, and 13 of pears. The total number of fruit-trees is 1,331. The forestry plantations contain 24,365 trees, consisting of yellow cotton-wood, green ash, European larch, black walnut, butternut, honey-locust, sugar-maple, scarlet maple, catalpa, ash-leaf maple, red pine, American larch, birch, white pine, shell-bark hickory, and American elm. One hundred and eleven species of trees and shrubs are now growing in the arboretum, gardens, and ornamental grounds of the college. During the year there have been sold 21,024 acres of the congressional land-grant of 1862, at an average price of $2.22 per acre. The number of acres remaining unsold is 176,975. The total expenses of the college for the fiscal year 1875, including all the improvements, were $57,114; $18,554 of which were paid for teachers' salaries.

The college has 7 professors and 10 assistants. The number of students for the collegiate year is 277, namely, 110 in the agricultural department, 25 in the mechanical, and 142 ladies pursuing the ladies' course; graduates 20; since the college received the congressional land-grant, 80.

KANSAS.

Kansas State Agricultural College, at Manhattan, Rev. John A. Anderson, president.—The professor of English literature and history has re

signed, and his duties are at present performed by the professors of the other departments. A mechanical building, 38 feet wide and 102 long, has been erected. It is constructed of stone, and two stories high. A considerable quantity of apparatus has been purchased for the laboratory, and tools provided for the farm, carpenters', blacksmiths', and other shops. Experiments have been made on the farm with 45 varieties of grasses, sown in plats and fields; and with several varieties of grains, furnished by the Department of Agriculture. They seem to prove that alfalfa or lucern will be the most valuable forage-plant for Kansas, and the only clover-plant, so called, that will endure the heat and dryness of that climate. Some success has been had in experiments with timothy and blue-grass.

Practical agriculture, (including stock-breeding,) horticulture, botany, entomology, physiology, physics, chemistry, industrial drawing, and applied mathematics, received the most attention in the agricultural and mechanical courses of study, and are supplemented by careful practice in the field and workshop. On the farm, 700 bushels of corn, 200 of wheat, 60 of barley, and 30 tons of millet have been raised. Short-horn, Devon, Jersey, and Galloway cattle, and Berkshire and Essex swine constitute the farm-stock. In the western part of the State the Devon and Galloway breeds are considered the best; in the eastern, the Short-horn. Berkshire swine are preferred to all other breeds. Two thousand and eighty acres of the congressional land-grant have been sold during the present year, at an average price of $6.25 per acre; 32,505 remain unsold, and are offered in the market for $6.25 per acre.

The college has 7 professors, 7 assistants, and one lecturer. Number of students for the collegiate year, 237, 154 of whom are males, and 83 females; all pursue agricultural or mechanical studies. Graduates, 2; since the college received the congressional land-grant, 22.

KENTUCKY.

Kentucky University—Agricultural and Mechanical College, at Lexington, John B. Bowman, LL.D., regent.—Some changes have been made in the faculty of the college. H. W. Everest, A. M., has been elected professor of natural history, and Col. G. N. Whistler, United States Army, commandant of cadets and professor of civil engineering. Several experiments have been made on the college-farm in the culture of various crops. Fultz wheat has been found to be very valuable, being less liable to injury from freezing and thawing in winter, and freer from rust and the midge than any other variety on which experiments have been made. Hemp has also proved one of the most profitable crops for cultivation, especially in the blue-grass region of Kentucky. About fifty graded cattle are kept on the farm, principally for dairy purposes, and Berkshire and Chester white swine; the Berkshire breed is preferred. In the agricultural course, chemistry, botany, and zoölogy are made the most prominent studies. A course of lectures has been given on these subjects to the students in that course. The mechanical department is suspended, at present, for want of the necessary funds to conduct it successfully.

There are 7 professors and 1 assistant in the agricultural and mechanical college. Number of students during the collegiate year, 95, 25 of whom pursue agricultural studies; graduates, 24; since receiving the congressional land-grant, 148; the university enrolls 25 professors, 7 assistants, and 260 students.

LOUISIANA.

Louisiana State Agricultural and Mechanical College, at New Orleans, Maj. J. L. Cross, president.—This college has been opened only about a year and a half. Few changes have been made since our last report. A professor in botany has been added to the faculty, and a change made in the professor of modern languages. The college-farm now contains 600 acres. Considerable improvements have been made during the year, in order to prepare it for experiments in the culture of sugar, rice, fruits, &c. The college appears to be conducted with judgment and energy. It opened last year with 60 students, but now contains 75 in the day school and 150 in the evening school. They are all pursuing agricultural or mechanical studies.

The evening school is open from 7 to 9 o'clock during five evenings each week. The branches taught are pure and applied mathematics, natural philosophy and chemistry, as applied to the arts and sciences, mechanical and architectural drawing, modern languages, history, and English literature. The school is designed for those who are engaged during the day in the various arts and trades, and can not afford to devote any time to study except in the evening. Mathematics, the natural sciences, modern languages, English literature, and drawing are at present made the most prominent branches of study in both schools.

The college has 4 professors and 2 assistants; students during the collegiate year, 225.

MAINE.

Maine State College of Agriculture and the Mechanic Arts, at Orono, Rev. Charles F. Allen, D. D., president.—The college has 6 professors and 2 assistants. A course of lectures has been given on stock-breeding, agricultural implements, natural history, physics, and rural law. The branches of study made especially prominent are agriculture, botany, and civil and mechanical engineering. Instruction in botany commences early in spring, and continues till late in autumn. It embraces a thorough drill in botanical analysis, and a careful study of plants, as to their relative importance, geographical distribution, and commercial and medicinal value. Attention is also given to plants cultivated for ornament, and those which are poisonous or otherwise injurious, as weeds, &c.

Careful experiments have been conducted in feeding swine, planting potatoes, drilling wheat, culture of onions, and testing the quality and effects of different kinds of fertilizers. There have been raised on the college-farm 100 tons of hay, 400 bushels of potatoes, 1,000 of beets and turnips, and 50 of wheat. The stock kept comprises Short-horn, Jersey, and Ayrshire cows; Chester-White and Berkshire swine; and Southdown sheep. The number of cattle is 33, and the total value of all the stock kept is $4,201. The greatest wants of the college at the present time are a convenient building for recitations, a chapel, and an ample apparatus and library.

The number of students during the collegiate year is 115, all pursuing agricultural or mechanical studies; graduates, 18; since the college received the congressional land-grant, 37.

MARYLAND.

Maryland Agricultural College, at College Station, Capt. William H. Parker, president.—Several changes have been made during the year in

the faculty of this college, only two of the former members remaining. As now constituted, it consists of Capt. William H. Parker, president, and professor of mathematics; Nicholas B. Worthington, A. M., professor of English literature; T. M. Jones, professor of agriculture; Joseph A. Clarkson, assistant professor of chemistry and natural sciences; and R. E. Nelson, jr., assistant professor of mechanics.

No experiments of special importance have been made on the farm. There have been raised 200 bushels of corn, 175 of rye, 20 tons of hay, a few bushels of wheat and oats, a great abundance of garden-vegetables, and a large yield of grapes. Ayrshire and Devon cattle, Cotswold sheep, and Berkshire hogs constitute the stock kept on the farm, and are considered by the college as the best breeds for Maryland. Some Devon cows and Cotswold sheep have been added to the farm-stock during the year, and more are still needed. Agriculture is to be made a leading feature of the college. The branches made most prominent are agricultural botany, chemistry, and practical civil engineering. Physical geography has been recently added to the curriculum. Courses of lectures are given by the professors on fertilizers, geology, mineralogy, natural history, botany, and rural architecture; also, public lectures twice a week by non-residents on specialties in agriculture and horiculture. Among the wants of the college may be named more buildings, more agricultural implements, and a complete laboratory.

The college has 3 professors and 2 assistants. The number of students for the collegiate year is 52, 35 of whom are pursuing agricultural or mechanical studies; graduates, 4; since the college received the congressional land-grant, 22.

MASSACHUSETTS.

Massachusetts Agricultural College, at Amherst, William S. Clark, Ph. D., LL.D., president.—A large amount of work has been done during the year by this college. To the different classes pursuing agriculture and horticulture three hundred lectures have been given, embracing the following subjects: The necessity of agriculture as an occupation, the relations of agriculture to other industries and arts, the influence of agriculture on national prosperity; education, special and general, as an element of success in agriculture; origin and composition of soils, chemical conditions and changes of soil, physical properties and improvement of soils; drainage, irrigation, tillage; effect on the soil of producing plants naturally; the effect on the soil by artificial production of plants, plowing in green crops, crop-rotation, manures, farm-economy and farm-accounts, special details of farm-management in general farming, grain-farming, and stock-farming, special farm-crops, stock-husbandry, principles of breeding, rearing, and training of domestic animals. Among the branches taught in the regular course of study, chemistry, botany, zoölogy, and veterinary science are made especially prominent.

The professor of agriculture has conducted a series of experiments in feeding plants, and thinks that he has discovered or established the fact that certain chemical elements are more reliable and efficacious in the production of crops than farm-yard manure; that the worn soils of Massachusetts can be made to produce luxuriant crops of grain, grass, and roots without farm-yard manure, and at the same time the permanent fertility of the soil be improved; and that, as a consequence, the keeping of cattle on the farm for the purpose of enriching it is not a necessity. The farm superintendent has experimented with different varie-

ties of Indian corn to ascertain the variety best adapted to the soil and climate of Massachusetts.

In the chemical department, Prof. C. A. Goessmann has been engaged in order to determine, (1) the effects of certain mineral substances upon the composition and flavor of the grape, especially the effects of potassium and magnesia; (2) what changes are occurring on lands recently reclaimed by diking from the salt marshes at Marshfield, Plymouth County; (3) the relative value and importance of the sources of supply of our various commercial fertilizers; (4) the composition of the fertilizers sold in Massachusetts, made 60 analyses. The post-graduate students have been employed, under the direction of Professor Goessmann, in various important chemical analyses. They have investigated the chemical composition of the excrements of fowls as affected by the character of their food; analyzed the ash of onions, sugar-beet molasses, and several species of fern; determined the percentage of sugar and acids in several varieties of grapes; and also, under the direction of President Clark, made a large number of interesting observations on the phenomena of plant life. The following crops have been raised during the present year on the college-farm: Potatoes, 2,960 bushels, on 14.72 acres; corn, 776 bushels, shelled, on 13.80 acres; rye, 21 bushels and 22 cwt. of straw, on 3 acres; oats, 13 tons of dried fodder, on 6 acres; squashes, 14 tons, on 1.90 acres; small fruits, 450 quarts, on 1.48 acres; and a large quantity of garden-vegetables, on 1.13 acres. Three acres are under cultivation in a young orchard; 2 acres in a vineyard; 1.12 in a nursery; and 3 in an arboretum; making 51.15 acres in tillage. There were also cut 142 tons of hay, on 142.14 acres.

In answer to the inquiry as to what breeds of stock are kept on the college-farm, and what are considered best for Massachusetts, the farm superintendent says: "The breeds of stock are Ayrshire, Jersey, Dutch or Holstein, and Brittany cattle; Chester-white, Berkshire, and Essex swine; Cotswold sheep, and numerous varieties of poultry, pigeons, and rabbits. With careful management, all these breeds have done well and made a good return for the capital and labor invested. All have special excellencies commending them to particular needs and conditions. It would be difficult, if not impossible, to select a single breed as best for the whole State. Steadily increasing intelligence is leading farmers to mix and blend the different pure breeds of cattle with each other and with the native breeds in varying but well-considered proportions, and thus to produce cattle especially adapted to the wants and conditions of different classes and localities. The male animals belonging to the college have been extensively used on the stock of this and the neighboring towns, and it is the unsolicited testimony of good judges that the use of them has effected an improvement in the stock of Hampshire more than sufficient to repay the whole cost of the agricultural department of the college."

The college has 9 professors and 2 assistants. The number of students during the collegiate year was 111; graduates, 18; since the college received the congressional land-grant, 98.

Massachusetts Institute of Technology, at Boston, John D. Runkle, Ph. D., LL.D., president.—The usual amount of solid and thorough work has been done by this institute during the year. A large number of experiments have been made on steam, under various conditions, and especially on cylinder condensation. Courses of lectures have been given in physics, general quantitative analysis, special methods of quantitative analysis, organic chemistry, logic, and mental philosophy. An ar-

rangement has been made with the Lowell Institute by which distinct courses of instruction are given by the professors of the institute of technology, free of charge, in mathematics, physics, drawing, chemistry, geology, natural history, philosophy, English, French, German, history, navigation, and nautical astronomy, architecture, and engineering. The sessions are generally held in the evening, and are open to pupils of both sexes. These courses will be more or less varied from year to year by the omission or interchange of particular subjects, as the interests of the institute and students demand. For the year 1875-'76, there were proposed in general chemistry, 24 laboratory exercises; qualitative analysis, 24 laboratory exercises; mental philosophy, 18 lectures; physiology and the laws of health, 18 lectures; heat and its applications, 18 lectures; perspective and the perspective shadows, with applications, 18 lectures; light in its relation to color, 18 lectures; and elementary German, 18 lessons. Provision has also been made, in connection with the Lowell Institute, for a course of free instruction in practical design, open to both sexes, who are taught in the art of making patterns for prints, delaines, silks, paper-hangings, carpets, oil-cloths, &c. The course embraces original design or composition of patterns; secondary design or variation of patterns; the making of working-drawings, and technical manipulations. The class is under the personal direction of Mr. Charles Kastner, for fourteen years designer in the Pacific Mills, formerly director of the Atelier Lebert in Paris, and nephew and pupil of M. Jean Baptiste Lebert, dessinateur, of Mulhouse, in Alsace.

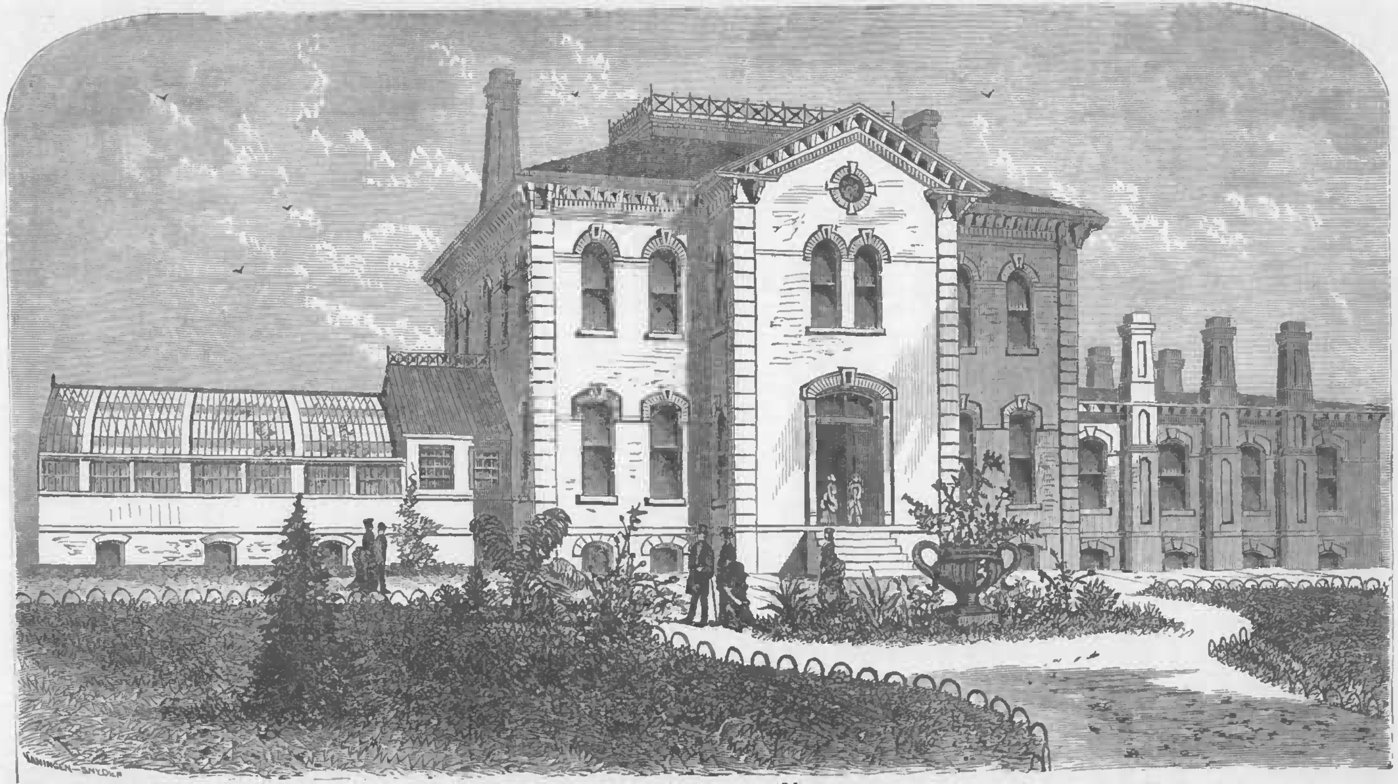
During the summer vacation, an educational excursion of three weeks was made, by the professors and students of the mining and metallurgical departments, to New Brunswick and Nova Scotia, for the purpose of making practical examinations of the mines of that section of country. The places of special interest visited were the Albertite mine in Hillsborough, the Goggins coal-mines, the Acadia iron-mines and works at Londonderry, the coal-mines at New Glasgow, the conglomerate gold diggings at Gay's River, the quartz gold-mines at Waverley and Montgomery, the gypsum at Windsor, the trappean minerals at Cape Blomedon, the antimony mines at Lake George, (New Brunswick,) and the Katahdin iron-mines and works near Moosehead Lake, (Maine.) A new dining-room, with kitchen, store-room, and caterer's quarters, has been added to the drill-hall and gymnasium-building during the year.

The institute has 22 professors and 15 assistants. The number of students during the collegiate year was 280; graduates, 30; graduates since the institute received the congressional land-grant, 126.

MICHIGAN.

Michigan State Agricultural College, at Lansing, Theophilus C. Abbot, LL.D., president.—Several changes have been made in the faculty since our last report. Alfred B. Gulley has been elected professor of agriculture, in place of Manly Miles, M. D.; Robert G. Baird, secretary, in place of William H. Marston; Charles L. Ingersoll, B. S., foreman of the farm, in place of Edwin H. Hume; and Rolla C. Carpenter, B. S., C. E., appointed instructor in mathematics and civil engineering. The college year, also, has been divided into three terms instead of two, as formerly. Important apparatus in chemical physics and meteorology has been purchased. Among the studies pursued, practical agriculture, vegetable physiology, chemistry, and zoölogy are made especially prominent.

Corn, turnips, oats, wheat, and clover have been cultivated on the college-farm in a regular six-years' rotation, about 21 acres being devoted to each crop. Also, considerable quantities of potatoes, fruits, and va-



AGRICULTURAL COLLEGE OF MINNESOTA.

PLATE LXI.

rious horticultural crops have been raised. Elaborate experiments have been conducted for many years with the view of educing principles which lie at the foundation of agriculture. Speaking of the labor system, the president says: "It works better and better now after a trial of nineteen years. All students labor except when exempt on account of physical disability. The regular hours of labor are from 1 o'clock to 4 each afternoon, except on Saturdays, when it is furnished only on request. As a matter of fact, five-sixths of the students do request it. The officers of the college work with the students, and personally superintend the work. It is a matter of my personal knowledge that the professor of agriculture and the professor of horticulture go out to the three hours' daily work with quite the same regularity as the students, and stay through the three hours. There is much in the atmosphere of a place that determines the habits of those that resort to it. Certain colleges are noted for certain characteristics of their students. If a student goes into a college where almost none work, he will be apt to do as others do, if he can. If the general aspect of the institution is one that looks toward professional literature, the ordinary young man will turn his face and bend his steps in the same direction. An agricultural college should exert a different tendency. For this reason it should be separate from other schools where labor is not required."

There have been sold of the congressional land-grant during the year 4,799 acres, at an average price of $3.08 per acre.

The college has 7 professors and 7 assistants. The number of students during the collegiate year is 156, 35 more than last year; graduates, 15; since the college received the national endowment, 123.

MINNESOTA.

University of Minnesota—Colleges of Agriculture and Mechanic Arts, at Minneapolis, William W. Folwell, M. A., president.—The agricultural college building, in course of construction, is nearly completed, and will soon be occupied. It is built of buff-colored brick, on a blue limestone basement, and embodies the latest improvements in scientific buildings of its class. It is the first of the special buildings for the separate colleges. A particular description of it may be found in the report of this Department for 1874, page 333. An engraving of the building is here given.

A large amount of work was done on the farm and in the garden during the year; 25 acres of land are now under cultivation, and 10 more are ready for breaking. Experiments have been made to test the comparative productiveness of different varieties of plants and the effects of various fertilizers on their growth, as follows: With corn, 10 varieties; wheat, 9; oats, 6; potatoes, 15; mangolds and sugar-beets, 7; beans, 5; field-pease, 1. In the vegetable-garden, with beans, 22 varieties; cabbages, 10; celery, 5; cucumbers, 5; watermelons, 6; musk-melons, 6; squashes, 10; pumpkins, 4; onions, 5; beets, 5; turnips, 3; sweet and pop corn, 12; sweet-potatoes, 4; peppers, 3; lettuce, 5; cauliflower, 3; pease, 26; parsnips, 2; radishes, 5; tomatoes, 8; broom-corn, 3. There have been raised on the farm, among other crops, 150 bushels of corn, 175 of oats, 100 of potatoes, and 60 tons of hay. In the orchard, 218 trees have been set, embracing 61 varieties of common apples, crab-apples, hybrids, plums, and cherries; in the fruit-garden, 32 varieties of blackberries, raspberries, currants, gooseberries, and strawberries. About 6,000 forest-trees, including a large number of evergreens, have been recently planted for experimental purposes, the

object being to determine what kinds are best adapted to the climate of Minnesota, and most desirable for cultivation. It is believed that such experiments will be the means of saving the State much time and money which are now lost in cultivating inferior species.

The course of study in the college of agriculture has been entirely remodeled during the year. Agricultural chemistry, veterinary science, and the theory and practice of agriculture and horticulture are made especially prominent. The course of lectures the present year embraces agricultural botany, horticulture, arboriculture, landscape-gardening, and economic entomology. The following are some of the special topics discussed: The botanical characters, properties, and peculiarities of the natural orders containing plants of interest to the farmer and horticulturist, with a special study of the most important individuals of these orders; the relations of heat, light, moisture, and food to plant-growth, and the means of controlling their supply and intensity; plant-houses and hot-beds; soils and manures, and their manipulation; propagation of plants; grafting, budding, pruning, and training; planting and transplanting; hybridizing, crossing, and selecting; cultivation of the apple, pear, plum, and other large fruits; cultivation of the currant, strawberry, raspberry, cranberry, and other small fruits; kitchen-gardening, market-gardening, and floriculture; reasons for planting forest-trees; what trees to plant; methods of propagating; care in the nursery; special culture of each species; the different systems of landscape-gardening and their applications; the principles of the art; desirable effects, and how to secure them; undesirable effects, and how to avoid them; a brief general view of the animal kingdom, and the general characters of insects; characters and peculiarities of the families containing useful or injurious members, with a special study of the most important individuals of these families.

Of the congressional land-grant, 4,954 acres have been sold during the present year, at an average price of $5.49 per acre; the number remaining unsold is 55,003 acres. Additions have been made to the museum of agriculture of 105 Patent-Office models; 125 specimens of grains and other seeds; 58 of grasses and grains in the straw; 49 of fruits preserved in alcohol, and several lithographs of fruits and animals.

The colleges of agriculture and mechanic arts have 8 professors and 2 assistants. The number of students during the collegiate year is 9; graduates, 3. The university has 11 professors and 5 assistants. The number of students was 237, all reported as pursuing some branches relating to agriculture and the mechanic arts. One instructor in physics and drawing has been added to the college faculty.

MISSISSIPPI.

University of Mississippi—College of Agriculture and the Mechanic Arts, at Oxford, General Alexander P. Stewart, chancellor.—The college of agriculture and the mechanic arts has 5 professors and 2 adjunct professors; the university, including all the departments, 9 professors, 3 adjunct professors, and 102 students. There are no students at present pursuing exclusively the agricultural course of study or learning agriculture practically on the college-farm; some branches, however, relating to agriculture are studied by the students in the other courses which they have selected. About 25 acres of the farm have been cultivated with tilled crops under the direction of the superintendent, and experiments made with cotton, corn, sweet-potatoes, Egyptian millet, chufa, clover, and grass. The following crops have been raised: Three bales

of cotton, 100 bushels of corn, 200 of potatoes, 5 tons of hay, and a large quantity of turnips. In the production of these crops it has been demonstrated that by a liberal use of manures they may be doubled, and sometimes quadrupled, at a cost so low that any farmer can afford to use them, and be largely profited by the investment. All the prominent agricultural journals in the United States, and a large selection of reviews and magazines are furnished for the reading-room of the students.

Some changes have been made in the faculty of the college during the year. Dr. L. C. Garland has resigned the professorship of physics and astronomy, and accepted the chancellorship of Vanderbilt University. A professor of chemistry, natural history, and geology has been elected, but has not yet entered upon the duties of his office. The trustees, in speaking of the success of the agricultural and mechanical college, say:

Admitting, as we must do, that our work is scarcely begun, and that our resources are as yet inadequate to the accomplishment of all that should be done in the great cause of industrial education, yet it is our determination to go forward, in the confident expectation of ultimate success, trusting to the generous support of the legislature, to the co-operation of the State and county agricultural associations, and to the fast-growing appreciation on the part of our agricultural population of the vital importance of a more rational practice of agriculture.

Alcorn University—Agricultural and Mechanical College, at Rodney, George B. Vashon, A. M., acting president.—Dr. Hyram R. Revels has resigned his position as president of the university. At the beginning of the present year the number of students in the university was 120; but in consequence of a law passed by the State legislature and approved January 9, 1875, by which free scholarships were abolished, the students began to leave it, and so rapid was the decrease that there were only about 40 remaining on the 3d of May following, and the university was then closed. A committee was subsequently appointed by the State legislature to investigate the affairs of the university, and they reported a bill for removing the entire board of trustees and all the officials, from the president down to the lowest employés, and making it the duty of the governor of the State to appoint a new board of trustees and a president. This bill became a law March 3, 1875. Accordingly, Governor Ames appointed a new board of trustees, and Prof. George B. Vashon, A. M., temporary president of the university. The trustees thought it best not to take immediate action as to the choice of a new faculty, but directed that the university be re-opened on the 18th of October of the present year, under the care of the temporary president, who, in conjunction with three assistants, was instructed to conduct the exercises of the university till a new faculty should be appointed, which will take place as soon as is thought advisable by the trustees. It is expected that the new faculty will be appointed within a few months, and that the university, including the agricultural and mechanical college, which has been so unfortunately interrupted, will enter again upon its former career of prosperity and usefulness. Only five students are now pursuing agricultural or mechanical studies.

Notwithstanding the closing of the college at the beginning of the crop-season, the operations on the college-farm have not been entirely suspended. There have been raised 400 bushels of turnips, 50 of beets, 2,000 heads of cabbages, 1,000 pumpkins, 100 bushels of peaches, and $275 worth of garden-products, consisting of beans, lettuce, carrots, melons, and okra. One Durham bull, 2 Durham cows, 31 Merino sheep, 10 Berkshire swine, and 57 others of inferior quality are kept on the farm. A handsome brick hall, called the "Adelphia," two stories high, 50 by 80

feet, and built in the Ionic style of architecture, has been appropriately fitted up for the use of the agricultural college. Three old frame buildings have also been transformed into convenient and tasty residences. A fine manikin, purchased in Paris, with models of the thorax and other parts of the human body, and one hundred and twenty-nine models of machines from the United States Patent-Office have been added to the cabinet.

MISSOURI.

University of the State of Missouri—Agricultural and Mechanical College, at Columbia, Daniel Read, LL. D., president; George C. Swallow, LL. D., dean of the college.—Experiments have been made during the year on the college-farm in subsoil-plowing, culture of fruit, sugar-beets, garden vegetables, and three kinds of hedges. Crops of corn, wheat, oats, and hay have been raised, but the quantity of each is not reported. Common and graded cattle and Berkshire swine are kept on the farm. The Berkshire breed is considered by the college to be the best for Missouri. Waters from the springs, wells, and cisterns, affording the water-supply of Columbia, have been analyzed and their constituents ascertained by the professor of agricultural and analytical chemistry, Paul Schweitzer, Ph. D. The observations of the professor on these waters will apply, in many respects, equally well to those in other parts of the country. He says:

> While there is danger in using the harder water of the springs, from their liability of producing bowel complaints of an aggravated character, there is hardly less danger from using rain-water, from its liability to become impure. Summer and fall are usually dry; the water gets low in the cisterns, and the atmospheric conditions become favorable to decomposition of organic matter swept into the cisterns from the shingle-roofs of the houses in the shape of dust, leaves, berries, and insects. Animal life, microscopic and otherwise, is developed, and the mainstay of our health, comfort, and civilization—naturally pure water—is put in question. Care and judgment in the selection of spring-waters and supervision of the cistern will, however, remove all difficulties.

Courses of lectures have been delivered to the students on fruit-culture, the vegetable-garden, landscape-gardening, meteorology, draining, soils and fertilizers, comparative anatomy and physiology of domestic animals, entomology, zoölogy, botany, physics, chemistry, mineralogy, and geology. The students also have access to the library and cabinet of the university. The library contains about 5,000 volumes and the cabinet 500,000 geological specimens. Several ladies have completed the course of study in horticulture and received diplomas. The great success which has attended the opening of the different departments of the university to women has encouraged the board of curators to enlarge the means and facilities for their accommodation. The "Hudson Mansion," a large and elegant edifice, has been fitted up for them as their special home. A matron is employed as superintendent and manager, and the price of board is put at actual cost. Of the congressional land-grant, 80 acres have been sold the present year, at an average price of $3.50 per acre. The number of acres remaining unsold is 328,429.

The agricultural and mechanical college has 7 professors and 6 assistants. The number of students for the collegiate year in the regular course of agriculture is 41; graduates in horticulture, 8; graduates since the college received the congressional land-grant, 5 in agriculture and 35 in horticulture. The university, including all the departments, has 16 professors, 16 assistants, and 491 students, 101 of whom are in the school of mines and metallurgy, at Rolla.

Missouri School of Mines and Metallurgy, at Rolla, (a department of the University of the State of Missouri,) Charles P. Williams, Ph. D., director.—During the year the curators of the university have purchased a fine edifice, the public-school building in the town of Rolla, at an expense of $25,000, which is considerably below the original cost. It is a large building, and will afford good accommodations for the school. In April last the State appropriated $10,000 for each of the years 1875 and 1876, toward the support of the school, and to aid in prosecuting the geological survey of the State. All the students engaged in practical work in the different departments of study—civil engineering, mine engineering, assaying, metallurgy, analytical chemistry, and cognate studies. Researches have been made on the leads produced in Missouri, and the work of the geological survey of the State, now in progress, has also been performed by the students of the school. By an act of the general assembly approved March 18, 1875, the school of mines and metallurgy was charged with the duty of conducting the geological State survey, and the professor of geology in the school is *ex officio* the State geologist. An account of the work done by this school during the year may be found in the report of the curators of the university for 1875.

Among the different branches of study pursued, analytical chemistry, drawing, and the pure and applied mathematics are made the most prominent. The courses of lectures before the school embrace metallurgy, geology, mineralogy, general and industrial chemistry, and mine engineering. The German language is thoroughly studied. The school has a good library of standard technical works, and is liberally furnished with apparatus, instruments, and other appliances for practical instruction and demonstration, besides diagrams and models for illustration of metallurgy, and for engineer, topographical, and ornamental drawing. The apparatus and library are valued at $22,000. The committee of mines and mining, appointed by the State to visit the school in January last, say:

> We do not intend to eulogize this institution with high-sounding phrases, nor do we mean to underrate the difficulties that each undertaking meets with during its incipient state, but with pride we acknowledge the unanimous opinion of your committee that this school is highly worthy of the people of the great State of Missouri, and in full coincidence with the intent which led to its creation.

A. W. Hare, M. E., has been elected assistant in the analytical laboratory, in place of Peter E. Blow, resigned. The school has 4 professors and 2 assistants. The number of students for the collegiate year was 101; graduates, 2; since the opening of the school, November 23, 1871, 5.

NEBRASKA.

The University of Nebraska—College of Agriculture, at Lincoln, Allen R. Benton, LL.D., chancellor.—A dormitory, containing twelve rooms, has been built during the year, at a cost of $3,850. Important improvements have also been made on the farm, which was purchased in September, 1874. A stone kitchen, connected with the farm-house, has been completed; a cattle-shed, poultry-house, coal-house, and piggery erected; a well dug for supplying the farm-house, barn, &c., with water; and the pasture inclosed with a substantial fence—the whole costing $1,417.55. Seven thousand dollars have been expended on the farm during the year for all purposes, including buildings, live-stock, farm-implements, fences, seeds, and cultivation. The donations which the college has received during the same period, consisting principally of farm-implements, amount to $598. One implement, a new McCormick

harvester, given by C. H. & L. J. McCormick, was valued at the factory at $190. Fifty-five acres have been cultivated with wheat, 18½ with oats, 19½ with barley, 68 with corn, 3 with broom-corn, 1 with sugar-beets, and 6 with miscellaneous crops, making a total of 171 acres. The following crops have been raised: Wheat, 694 bushels; oats, 500; barley, 390; corn, 4,000; buckwheat, 25. Experiments have been made with 38 varieties of potatoes, 10 of field and sweet corn, 6 of wheat, 14 of beans, 10 of pears, 23 of grasses, and with sugar-beets. A large part of the work on the farm has been performed by the students. They have worked, in the aggregate, during the year, 5,114 hours, for which they have been paid $778.16, being an average of $2.65 per week, a sum less by only 35 cents than the cost of their board per week.

The live-stock kept on the farm consists of thoroughbred Durham, Devon, Ayrshire, and Galloway cattle, and Essex, Berkshire, and Poland-China swine. Agricultural chemistry, vegetable and animal physiology, stock-breeding, bee-keeping, zoölogy, farm-economy, farm-implements, horticulture, arboriculture, and landscape-gardening are made the most prominent studies in the agricultural course. Three courses of lectures, of one term each, have been given daily to the students on the following subjects: The anatomy and physiology of domestic animals, the treatment of soils and cultivation of particular crops, the history and development of agriculture and agricultural implements, and a course of three weeks in bee-keeping.

Valuable additions have been made to the agricultural museum; a dynamometer for testing the draught of plows and other agricultural implements, a hay and stock scales for weighing experimental crops and for teaching students how to estimate the weight of live-stock, and the skeletons of a horse and a cow as aids for the study of the anatomy and physiology of domestic animals. The cabinet and herbarium have also been increased. Professor Aughey has devoted his vacations to collecting specimens of plants, insects, paleontology, and minerals, during which he has traveled in the State more than three thousand miles. He has prepared a list of the wild fruits of Nebraska, with descriptions of the species and varieties, and also a catalogue of the flora of all the plants of the State, to which he has added twenty species not before found there. The specimens of insects in the cabinet now number 3,500; of plants in the herbarium, 1,700; and of minerals added during the year, 498. A neat and spirited little monthly of eight pages, called the "Hesperian Student," has been published regularly by the students. None of the land granted by Congress under the act of July 2, 1862, has been sold.

The Agricultural College has 3 professors and 1 assistant; number of students during the collegiate year, 20; graduates since receiving the congressional land-scrip, 1. The university has 7 professors, 1 assistant, and 132 students.

NEVADA.

This State has made no progress during the year toward establishing an agricultural and mechanical college. None of the congressional land-grant has been sold. The preparatory department of the State University of Nevada, at Elko, is in operation, as stated in the report of this Department for 1874. A fine building was erected for its accommodation, by the citizens of Elko, previous to the opening of the school in October, 1874. No information has been received by which it may be known how soon the college contemplated by Congress will be incorporated and put in operation.

NEW HAMPSHIRE.

Dartmouth College—New Hampshire College of Agriculture and the Mechanic Arts, at Hanover, Rev. Asa D. Smith, D. D., LL. D., president.—During the year a new barn has been built and a dormitory completed. One hundred tons of hay, 500 bushels of oats, 240 of barley, 200 of carrots, and a large quantity of vegetables have been raised on the farm. The stock kept consists of Durham cattle and Chester County swine. The branches of study made most prominent in the agricultural and mechanical courses are mathematics, chemistry, and natural history. Regular courses of lectures have been given on various subjects connected with agriculture. The museum of geology and natural history has been considerably increased, through the liberality of friends, especially by the addition of Ward's restorations of gigantic extinct animals.

The college of agriculture and the mechanic arts has 10 professors and 4 assistants; number of students for the collegiate year, 29; graduates, 11; graduates since the college received the congressional land-grant, 21. The parent college, including all the departments, has 26 professors, 11 assistants, and 479 students.

NEW JERSEY.

Rutgers College—Scientific School, at New Brunswick, Rev. William H. Campbell, D. D., LL. D., president.—A large amount of work has been done in this school during the present year by Dr. George H. Cook, professor of agriculture, in testing and analyzing commercial fertilizers, some sixteen or twenty kinds of which have been analyzed, and their true commercial values determined. He says that there is a growing habit among farmers of buying simple fertilizers, as sulphate of ammonia, nitrate of potash, plain superphosphate of lime, muriate of potash, sulphate of potash, &c., and mixing them to suit their own circumstances, or using them separately. This habit, he says, should be cultivated, and when it is fully carried out, the farmer will be able to protect himself from fraud or from loss in using unnecessary manures. These simple fertilizers are for sale in New York, and probably in most of the large cities of the country, price-lists of which are forwarded by the dealers, on application.

Careful experiments have been made on the growth of corn and potatoes with different fertilizers, and others on wheat are now in progress, the details and results of which are given in the eleventh annual report of the scientific school. These experiments with crops, fertilizers, and soils, which have been systematically conducted on the college-farm for several years, have already yielded useful results, and they are every year becoming better appreciated and more highly valued by intelligent farmers in every part of the State. There were raised on the college-farm 70 bushels of wheat, on 10 acres, much injured by winter-killing; 24½ of rye, on one-half acre; 350 of oats, on 11½ acres, much injured by the army-worm; 900 of shelled corn, on 14 acres; 250 of potatoes, on 3 acres; 714 of beets, on one acre; 500 of carrots, on 3 acres; 700 of turnips, on 3 acres; 75 of tomatoes; 500 cabbages, on 1 acre; and 40 tons of hay, on 30 acres, injured by winter-killing. The variety of potatoes cultivated was the Early Rose; of beets, the Orange Globe, Long Red, and Lang's Sugar; of carrots, Bliss's Improved Long Orange; of turnips, Ruta-baga, Yellow-stone, Cow-horn, and Common Flat. Ayrshire, grade, and native cows, and Poland-China and Essex swine are kept on the farm. The cows have averaged 13 in number during the year. They

are kept for milk, and fed in the stable, not being pastured nor turned out any more than necessary to keep them in good health. The milk yielded by them and sold during the year amounted to 28,060 quarts, besides what was consumed on the farm. The Ayrshires are considered the best milkers, and are the most easily kept in good condition.

Among the branches taught in the agricultural course of study, agricultural chemistry is made most prominent. The students in mechanics and engineering had field practice this year, during their vacation of nearly three months, in the geological and topographical survey of the State. The agricultural lectures given by Dr. Cook in the different counties of the State have been principally on the subject of fertilizers. The State board of visitors express their opinion of the scientific school in the following terms:

> In justice to the State and to the trustees of Rutgers College, we wish to state distinctly our judgment that this institution is justifying the act of Congress in providing for the liberal education of young men who are to engage in industrial pursuits; for all its graduates, with scarcely an exception, have entered upon practical and business life, and are occupying positions of usefulness they could not have filled but for the education here received. We would also report that the trustees have faithfully fulfilled their obligations to the State in providing college buildings and an experimental farm for the agricultural college without charge to the United States fund.

The scientific school has 11 professors. The number of students during the collegiate year is 57, all of whom pursue agricultural or mechanical studies; graduates, 11; since it received the congressional land-grant, 69. Rutgers College, in all the departments, has 13 professors and 188 students.

NEW YORK.

Cornell University—Colleges of Agriculture and the Mechanic Arts, at Ithaca, Andrew D. White, LL. D., president.—During the year experiments have been made on the farm with cows to ascertain the best mode of feeding in order to increase the quantity of milk; with corn and potatoes, in respect to seed and fertilizers; with wheat, as to the mode of cultivation; with oats, as to fertilizers and mode of cultivation; and with numerous garden-vegetables. The following crops have been produced: Wheat, 230 bushels; corn, 955 bushels of ears; oats, 675 bushels; hay, 40 tons; apples, pears, and plums, 390 bushels; potatoes, 309 bushels; milk, 5,989 gallons, sold for $1,437.36; beef and pork, sold for $791.47; garden vegetables, sold for $1,425. The Holstein, Jersey, and grade Short-horn breeds of cattle are kept on the farm. Three Holstein and 3 Jersey cattle, and 3 Merino sheep, all thoroughbreds, have also been purchased the present year. It is the opinion of the college that, all things considered, a cross between a selected common cow and a thoroughbred bull of any breed is better for the State of New York than either the imported or the domestic animal. The breed which is best for any particular locality or State must depend upon the object had in view, whether beef, milk, or butter.

The course of lectures to the students in agriculture, the present year, embraces chemistry of plants and animals, drainage, management of soils, manures, products, farm-buildings, cattle, electricity, magnetism, heat, experimental mechanics, agricultural and economic botany, physiology, geology, veterinary anatomy, medicine and surgery, entomology, strength and preservation of materials, constitutional law, and political economy; to students in the mechanic arts, chemistry, electricity, magnetism, heat, acoustics, optics, and architecture. Of the congressional land-grant, 4,800 acres have been sold during the last year and the pres-

ent, (1875,) at an average price of $5.87 per acre. No report was made to the Department, in 1874, of the quantity sold during that year. The number of acres remaining unsold is 409,200. An ice-house has been erected and the barns improved. The Sage College for Women, erected through the liberality of Hon. Henry W. Sage, has been completed, and is ready for use. It is designed as a boarding-hall and dormitory for young women. No separate course of study is provided for them, but they are to be educated in the same classes, and to study the same branches as the young men. The two sexes are to be educated together, that an opportunity may be given to young women to pursue the highest course of study in the university, or any other course which they may select. The branches made most prominent in the agricultural course are agriculture, horticulture, chemistry, physics, geology, entomology, and veterinary science; in the mechanical course, mathematics, physics, drawing, and shop-practice.

The college of agriculture has 16 professors, and the college of mechanic arts 14. Some of the professors devote their whole time to instruction in these colleges and others only a part. The number of students in the college of agriculture during the collegiate year is 17; of the mechanic arts, 56; graduates from the former, 2; from the latter, 5; graduates from the former since receiving the congressional land-grant, 5; from the latter, 9; from the university, in all the departments, 352; professors in the university, 27; assistant professors, 11; instructors, 10; total, 48. Students, 532.

NORTH CAROLINA.

University of North Carolina—College of Agriculture and the Mechanic Arts, at Chapel Hill, Rev. Charles Phillips, D. D., acting president.—This university, after a suspension of about five years, has been reopened. The State legislature, at its last session, substituted new bonds for the money derived from the sale of the congressional land scrip, paying 6 per cent. annually, instead of the old ones on which no interest had been paid. The sum thus invested is $125,000, and the income derived from the same annually is $7,500. It also elected a new board of trustees for the university, who have removed the president and professors of the old faculty and appointed a new one, for which a president will be chosen at an early day.

Three courses of study have been arranged for the university: (1) The agricultural course, of three years; (2) the science course, of three years; (3) the course of arts, of four years. The latter course corresponds to the usual curriculum of the old colleges. The agricultural course embraces theoretical and practical agriculture, English language and literature, botany, zoölogy, chemistry, mineralogy, geology, mathematics, engineering, political economy, and constitutional law. The requirements for admission to this course are a competent knowledge of arithmetic, the English language, and geography. Graduates receive the title of bachelor of agriculture. The university buildings have been repaired and painted inside and out, and the campus improved. They will accommodate several hundred students, and it is believed that they are inferior to but few in the country in beauty and fitness for educational purposes. The time appointed for opening the university was the first Monday in September, but it was necessarily delayed beyond that time.

The college of agriculture and the mechanic arts has 5 professors and 7 students; others from different departments of the university re-

ceive some instruction in agriculture. The university, including all the departments, has 7 professors and 70 students, distributed as follows: Agricultural, 7; optional, 8; scientific, 25; and classical, 30.

OHIO.

Ohio Agricultural and Mechanical College, at Columbus, Edward Orton, Ph. D., president.—Miss Alice K. Williams has been appointed assistant in modern languages. Experiments have been conducted on the farm in underdraining, in thick and thin sowing of wheat, and in testing the comparative productiveness of different varieties of oats. Some interesting investigations have also been made on the diseases of domestic animals. Two thousand five hundred bushels of corn, 450 of wheat, 300 of oats, and 100 tons of hay have been raised. Short-horn cattle and Berkshire swine are kept on the farm. Short-horn cattle are declared to be decidedly the best breed for Ohio.

Chemistry, botany, zoölogy, geology, physics, mechanics, mathematics, surveying, book-keeping, and political economy receive a large share of attention in the agricultural and mechanical courses of study. Courses of lectures have been given to the advanced classes on soils, crops, manures, drainage, irrigation, fences, buildings, implements, machinery, orchards, vineyards, gardens, hedges, forestry, and domestic animals both in health and disease.

The college has 10 professors and 1 assistant. The number of students for the collegiate year is 100, 75 of whom were pursuing agricultural or mechanical studies. There are no graduates as yet, the college not having been opened a sufficient time for students to complete any of the courses of study prescribed.

OREGON.

Corvallis College—State Agricultural College, at Corvallis, B. L. Arnold, A. M., president.—Wheat and fruit have been cultivated on the farm, and numerous experiments made to test the effects of different fertilizers on the growth of crops. Careful analyses of various soils have also been made, and their constituents and agricultural value ascertained. No live-stock is kept on the farm. Agricultural chemistry and mathematics are made prominent branches in the agricultural and mechanical courses of study. A series of lectures has been given on meteorology, botany, fruit-culture, analysis of soils, fertilizers, and assay of metals. Seven hundred acres of the congressional land-grant of 1862 were sold during the year, at an average price of $2.50 per acre. This is the first sale of the land-endowment which has been made by the college. The number of acres remaining unsold is 89,300.

The college has 4 professors and 2 assistants. The number of students for the collegiate year is 155, 60 of whom were pursuing agricultural or mechanical studies; graduates, 2; since the college received congressional land-grant, 20.

PENNSYLVANIA.

Pennsylvania State College, Centre County, Rev. James Calder, D. D., president.—A change has been made in the professorships of chemistry and physics, modern languages and military tactics; and also in the instructor of music, and the assistant professor of the preparatory department. The manual-labor system has been modified, by which the time for each student to labor has been fixed at six hours per week

instead of ten, as formerly. Courses of lectures have been delivered to the students on agriculture, animal husbandry, and architecture.

Experiments have been made on the experimental farms with different fertilizers, different modes of cultivation, and varieties of grains; and from careful observations it is believed that success in agriculture depends mainly on the manures used, and the ability of manufacturing them properly. There have been raised on the three farms the present year 5,900 bushels of shelled corn, 1,150 of wheat, 50 of rye, 10 of barley, 1,200 of common potatoes, 20 of sweet-potatoes, 1,400 of sugar-beets, and 70 tons of hay. The breeds of cattle kept are the Durham, Ayrshire, Alderney, and Holstein. The Durhams are considered by the college to be the best for all purposes, for the State of Pennsylvania. Improvements have been made by painting the college-building and the professors' houses, and in erecting fences and removing stones from the farms.

The college has 8 professors and 4 assistants. The number of students for the collegiate year is 148; graduates in agriculture, 3; since the college received the congressional land-grant, 45.

RHODE ISLAND.

Brown University—Agricultural and Mechanical Department, at Providence; Rev. E. G. Robinson, D.D., LL.D., president.—The professor of zoölogy and agriculture has given a course of lectures on zoölogy, especially in its relations to agriculture. Also lectures have been given on soils, botany, and ornithology. In addition to the regular classes of students in agriculture, 52 seniors have attended these lectures. The professor has also collected several hundreds of specimens of natural history in Florida, consisting of insects, fishes, reptiles, birds, &c. Two mounted skeletons, one of a horse and the other of a buffalo, have been purchased for the museum. Other additions have been made, which are almost indispensable for illustrating subjects connected with agriculture. Several new and expensive cases have been purchased for the reception of valuable specimens in natural history, which have been rapidly accumulating for a few years past. The addition to Rhode Island Hall, which was in progress last year, has been completed, and the cases of natural-history specimens have been removed to the room on the first floor of the addition. Two recitation-rooms, which have been reconstructed, are now occupied, and found to be well adapted to the purposes for which they were intended. It has been proposed by the faculty of the university to extend the agricultural and mechanical courses of study for the degree of bachelor of philosophy to four years instead of three, as at present. The object of the change is to prepare the students more thoroughly for entering upon the practice of the important business of agriculture and the mechanic arts.

The agricultural and mechanical department has 10 professors and 3 assistants; students during the collegiate year, 40; graduates, 10. The university in all the departments has 11 professors, 4 assistants, and 255 students.

SOUTH CAROLINA.

Claflin University—South Carolina Agricultural College and Mechanics' Institute, at Orangeburg, Rev. Edward Cooke, D.D., president.—This college is still struggling against embarrassments arising from the non-payment of the interest due it from the State on the bonds derived from the sale of the congressional land-grant. These bonds, amounting to

$191,800, were hypothecated in New York for a State loan, and have never come into the custody of the trustees of the college. The State has had the use of them for five years. The interest for that time, at 6 per cent., would amount to $57,540, of which only $11,836 have been paid, leaving a balance of $45,704 due the college. The State legislature at its last session made an appropriation of $1,800 for the benefit of the college. This is the first aid it has received directly from the State. Being thus deprived of the necessary funds, the college has made comparatively little progress. It has, however, the present year, formed an agricultural class of about 20 students, who have commenced the studies of the first year of the course. The experimental farm has been partly paid for, but the want of funds has rendered it impossible to make any important improvements on it, or to purchase farm-implements for its cultivation.

The university, in all the departments, has 4 professors, 1 assistant, and 209 students; the college, 2 professors, and 20 students, during the collegiate year.

TENNESSEE.

East Tennessee University—Tennessee Agricultural College, at Knoxville, Rev. Thomas W. Humes, S. T. D., president.—Lieut. A. H. Nave, U. S. A., has been elected professor of military tactics, and Samuel B. Crawford, B. A., instructor in the preparatory department, in place of Albert W. Wakefield, B. A., B. S., resigned. Experiments have been made on the farm in testing the value of different manures, in thick and thin sowing of wheat, and in fattening cattle, with special reference to cost. Crops of corn, wheat, buckwheat, oats, potatoes, clover, timothy, and orchard-grass have been raised, but the quantities have not been reported. Short-horn cattle and Cotswold sheep are considered best for Tennessee on rich pasture-land, and Devon, Jersey, and native cattle, and South-down and Merino sheep on land in ordinary condition. Berkshire hogs are preferred.

The branches of study made most prominent in the agricultural and mechanical courses of study are chemistry and zoölogy, theoretical and applied to agriculture; botany, physical geography, mathematics, and physics. Lectures have also been given in applied botany, zoölogy, and rural economy. Post-graduate instruction is also provided for such as desire it, and are prepared to prosecute their studies beyond the college courses.

The university, including all the departments, has 9 professors and 7 instructors, all of whom are employed a part of their time in the agricultural college; students, 315. The number of students in the college during the collegiate year is 53; graduates, 8; graduates since receiving the congressional land-grant, 30.

TEXAS.

Agricultural and Mechanical College of Texas, at Bryan.—At the time of making our last report it was expected that this college would be opened in September of the present year, but, in consequence of unforeseen delays, the intentions of the commissioners could not be carried out. The college-building, however, has been completed, and as soon as a competent corps of professors can be selected, the work of instruction will commence. It is a fine brick edifice, 152 feet long, 56 wide, and four stories high, and contains a large number of rooms well adapted to the purposes for which they were designed. A large and commodious

boarding-house, called "Steward's Hall," has also been erected. The commissioners of the college are Spencer Ford, A. S. Broaddus, and James H. Raymond.

VERMONT.

University of Vermont and State Agricultural College, at Burlington, Matthew H. Buckham, A. M., president.—Few changes have been made in the operations of the college during the year. Richard A. Rice has been elected professor of modern languages. Seven professors are employed a portion of their time in giving instruction in the course of study in agriculture and related branches, which occupies four years. In this course, agricultural chemistry is made especially prominent. In consequence of a want of the necessary funds, the college has not been able, as yet, to purchase a farm, and employ a professor of agriculture who may devote his time exclusively to this subject. The president, in his report, says:

> The next forward step in the agricultural department will be the appointment of a professor of agriculture, who shall be able to devote his whole time to instruction and investigation in this department. A thoroughly competent man in this chair might accomplish a great deal for agriculture. The vicinity of the Horse Stock Company's farm at Sherburne, and the herds of Shedd and Van Sicklen, Peter La Clair, and G. L. Reynolds, three of the finest herds in New England, would give ample opportunity for illustrating the principles of breeding and veterinary practice.

The agricultural college has 7 professors; students during the collegiate year, 14; graduates, 3; since receiving the congressional land-grant, 23. The university, in all the departments, has 19 professors, 4 assistants, and 153 students.

VIRGINIA.

Virginia Agricultural and Mechanical College, at Blacksburg, Charles L. C. Minor, LL. D., president.—At the annual college commencement, on the 12th of August of the present year, the corner-stones of two new college-buildings were laid with great rejoicing, the whole neighboring country and many persons from distant parts of the State assembling, in spite of the heavy rain, to witness the ceremonies and hear the address. These buildings are each 135 feet long, 45 wide, and two stories high, with basement. The State superintendent of public instruction says:

> They were planned with great care and economy, and will provide the most conveniently-arranged recitation-rooms and laboratories within my knowledge.

They are now in course of construction. One is so far completed that it has received the roof, and the other is begun. They are constructed of brick, with slate roofs. Two dwelling-houses of the same material, one for the president and the other for one of the professors, are also nearly finished. The two-story shop of the mechanical department, completed last year, has been furnished with a steam-engine of eight-horse power, a circular saw, a vertical saw, lathe, forge, work-benches, and tools. Telegraphy, photography, and printing are taught and practiced, with the necessary apparatus recently purchased for that purpose. Two printing-presses are in operation, with a full supply of type.

Corn, wheat, oats, potatoes, turnips, and grass have been cultivated on the farm, and considerable quantities of apples raised. Six or eight students, especially devoted to the study of agriculture, are provided with quarters and a mess-garden on the farm, and receive compensation for work done in the supervision and execution of such specialties as may be selected by the professor of agriculture for each of them. They

enjoy great advantages in the pursuit of their studies, and receive important assistance in paying their expenses. The breeds of cattle kept on the college-farm are Short-horns and Alderneys; of swine, the Berkshire. These breeds are regarded by the college as the best for Virginia. Military instruction is confined to drill in the school of the soldier, the company, and the battalion. The equipment consists of Enfield rifles, 160 muzzle-loaders, and 150 cadet breech-loaders, with accouterments, swords, flags, &c.

The college has 7 professors. The number of students during the collegiate year is 222; graduates, 12; being the first since the opening of the college, October 1, 1872. Students are rapidly increasing, and many who applied for admission the last year and the present have been refused for want of accommodations and money to pay the necessary staff of instructors and apparatus for illustration.

Hampton Normal and Agricultural Institute, at Hampton, General Samuel C. Armstrong, president.—This institute is truly industrial and educational. The great object kept in view in its management has been to make the students not only skillful and practical farmers, mechanics, and scholars, but also to teach them how to help themselves, and become virtuous and useful citizens in all the departments of life. Agriculture and the mechanic arts are taught by books, lectures, and daily practice on the farm and in the shop. Besides the branches taught from books in the regular course of study, the girls learn housework and sewing, both by hand and on the machine. Seven years have elapsed since the first incorporation of the institute, and about three since it received the congressional endowment. During the seven years 563 students have been admitted, 342 of whom were boys and 221 girls. Of this number, 76 boys and 37 girls have completed the course of study of three years, and graduated. The trustees are making an effort to raise for the institute a permanent fund of $200,000 by donations from benevolent persons, which sum they hope will be sufficient, in connection with the $95,000 from congressional land-grant, to place it on a permanent basis, and enable it to pay the annual expenses, about $35,000, without relying on private donations, as it is now obliged to do for a considerable part. Since the establishment of the institute, September 21, 1868, the trustees have paid in money, received principally from donations and the Freedmen's Bureau, as follows: For real estate—farm-land, 115 acres, and school premises, 10 acres, $19,000; Virginia Hall, including steam-works, $81,695.81; Academic Hall, $48,552.97; Maple Cottage, $2,277.74; farm-house, $3,975.50; mansion, $2,000; Grigg's Hall, $4,000; engineer's cottage, $1,500; conservatory, $258.40; Butler school-building, $750; total, $164,010.43. For accessories—farm implements, $2,628.42; furniture, $13,032.13; farm-stock, $4,177.90; total, $19,838.45. Sum total of real estate and accessories, $183,848.87. A new dormitory building for male students has been erected, at a cost of $5,550, which will accommodate 35.

The work on the farm is nearly all done by the students. During the present year 1,200 bushels of corn have been raised, on 40 acres; 330 of oats, on 25 acres; 1,650 of early potatoes, on 12 acres; 500 of late potatoes, on 4 acres; 412 of sweet-potatoes, on 9 acres: 1,000 of mangolds, on 1½ acres; 100 of tomatoes, on one-half acre; 206 of unshelled green peas, on one-half acre; 84 of unshelled green beans, on 1 acre; 75 bushels of strawberries, on one-half acre; 100 of cherries, on 2 acres; 12 tons of clover, on 25 acres. Asparagus raised on 4 acres sold for $400; peaches, on 5 acres, for $270. Three acres were also cultivated with rye for soiling; 12 acres, with corn for fodder; and 2½ acres, with cabbages. The

total receipts from the farm amounted to $8,053.29. Twenty-five gallons of milk were sold, on an average, daily from the farm. Thirty-six cattle are kept on the farm, consisting of Durham, Ayrshire, and Alderney breeds; 10 horses, 2 mules, and 57 swine. The Ayrshire and Alderney breeds are considered by the institute as the most profitable for milk, and the Essex breed of swine for pork. A steam-engine has been purchased which is used for steaming fodder for cattle, and for driving a thrashing-machine on the farm and for the neighboring farmers.

Students are detailed in their various labors as follows: Boys on the farm, 90; in printing-office, 3; carpenters, 4; coopers, 3; shoemakers, 3; joiners, 4; office duty, 2; mail-carriers, 2; waiters, 11; employed by teachers, 2; police and guard duty, 6; day-scholars on orderly duty, 19; teaching, 2; girls employed in industrial room and housework, 78; day-scholars mostly employed at home, 11. Most of the students are detailed for labor one and a half school-days in each week, and for half or whole Saturdays. Needy students are provided with extra days' work. During the summer vacation of three and a half months, nearly all are engaged in teaching, farming, or hotel service to pay their old debts and provide funds for the next term. All are paid at the rate of 5 to 10 cents per hour. For the present year they received for work $6,651. Sixty girls in the industrial department manufactured 1,319 garments, for which they were paid $517.17; also, they did work in the boarding department amounting to $136.25. The entire cash expense for an able-bodied student over eighteen years of age for one school-year, including board, fuel, washing, lights, furnished room, mending garments, and medical attendance, is $42.50; the balance is worked out.

The Southern Workman, an illustrated monthly, edited by the president of the institute, and printed by the students, is devoted to the interests of the students and the industrial classes of the South. It has a circulation of 1,700 copies. The subscription price is $1 per year. Besides affording colored youth an opportunity of learning the printer's trade, it aims to give an impartial and reliable account of educational and industrial matters, especially among the freedmen. Many of the letters received from the 150 teachers who have been educated and sent out from the institute are published in this paper, and furnish interesting and reliable accounts of the real life and condition of the colored people. As a rule, these teachers bear a high character, and are the builders of the civilization and Christianity of the colored race. An illustrated Sunday-school edition of the Southern Workman is also published, at 1 cent per copy. It contains the regular international Sunday-school lessons, with comments prepared by an experienced teacher of the institute.

During the collegiate year the institute has had 15 teachers, 4 assistants, and 201 students; pursuing agricultural or mechanical studies, 128; graduates, 45; since receiving the congressional land-grant, 113.

WEST VIRGINIA.

West Virginia University—Agricultural Department—at Morgantown, Rev. J. W. Scott, D. D., LL.D., acting president.—Several changes have been made in the faculty of the university, including the department of agriculture. The presidency is vacant, and Rev. J. W. Scott, D.D., LL.D., acting as provisional president. Lieut. E. T. Richmond, United States Army, has been elected professor of mathematics and military science; J. I. Harvey, A. M., professor of modern languages and literature; T.

W. V. Macbeth, professor of history, political economy, and belles-lettres; and Frank Woods, A. B., assistant in the preparatory department. No crops have been raised, the university having no farm except the college campus, of 25 acres, and only a small portion of this has been plowed at all. Two prizes are offered to students, one of $15 to the best declaimer and the other of $25 to the writer of the best essay on any given subject.

The university, including all the departments, has 7 professors and 5 assistants, and the department of agriculture 5 professors, who are engaged a part of the time in its service. The number of students in the university during the collegiate year is 125, 15 of whom received instruction in agricultural or mechanical studies.

WISCONSIN.

University of Wisconsin—College of Arts, at Madison, Rev. John Bascom, D. D., LL. D., president.—At its last session, the legislature of the State made an appropriation of $80,000 to the university for the erection of a building adapted to purposes of instruction in the various branches of natural science. It is to be called "Science Hall," and when finished will accommodate 600 students. It is now in course of construction, and according to the contract is to be completed by the 1st of October, 1876. The first floor will contain an assay-laboratory, work-room, qualitative chemical-laboratory, physical-laboratory, machine-shop, carpenter-shop, and heating-apparatus; the second floor, a chemical lecture-room, quantitative chemical-laboratory, private-laboratory, apparatus-room, etc.; the third floor, geological lecture-room, mineralogical and blow-pipe laboratory, private-laboratory, engineering lecture-room, and mechanical drafting-room; fourth floor, cabinet, students' work-room, natural-history lecture-room, study of professor of natural history, art-gallery, and curator's study. Besides the rooms named, there are numerous smaller ones, adapted to the convenience of the various departments of instruction. Among the numerous branches to be taught in this building, mathematics, botany, zoölogy, chemistry, physics, and mechanics, with their applications, geology, mineralogy, and drawing, are made especially prominent. This building affords many advantages to the agricultural college, and will give a new impetus to its operations. The teaching in the university and college is designed to be comprehensive and thorough. In speaking of the young ladies who have been admitted, President Bascom says:

> During the past year the young women have been put in all respects on precisely the same footing in the university with the young men. No difficulties have arisen from it. There were eight young women among the graduates at the commencement. Their average scholarship was certainly as high as that of the young men, and they were apparently in good health.

The professor of agriculture, W. W. Daniells, has conducted elaborate experiments on the experimental farm in the culture of Diehl, Prussian, Fultz, Red Mammoth, White Michigan, Oran, Odessa, German, Fife, Arnautka, Bismarck, and Chamberlain wheat; Saxonian, Common, and Manshury barley; Somerset, Bohemian, Houghton, White Schoenen, Early Fallow, and Canada oats; White Australian, Cherokee, Yellow Dent, and Early Yellow Dent corn; Alpha, Sutton's Red-skin, Flowerball, Acme, Eureka, Nonesuch, Hundred-fold, Brownell's Beauty, Early Rose, Early Favorite, Snow-flake, Extra Early Vermont, Compton's Surprise, and Peach-blow potatoes; also in the improvement of soils by mechanical means, as deep and shallow plowing, subsoiling, &c.

The details of all these experiments may be found in the annual report of the university for 1875.

The productive fund of the agricultural college derived from the congressional land-grant is $236,133.90, and the annual income $16,148.41; of the university, exclusive of the college, $222,225.89, and the annual income $15,403.48. The university is the property of the State, and under its care and protection in the same manner as the common schools. During the present year 2,848 acres of the land granted by Congress to the agricultural college have been sold, at an average price of $1.15 per acre; 52,403 remain unsold. The sum of $1,154 has been expended for apparatus, $840 for books for library, $56 for the cabinet, and $31,574 for teachers' salaries. The products of the farm were sold for $860.

The university has 17 professors, 10 assistants, and 345 students for the collegiate year; the agricultural and mechanical college, 9 professors, 5 assistants, and 17 students; graduates of the latter, 3; since the college received the congressional land-scrip, 10.

Statistics for 1875 of the industrial institutions of the United States which have

Number of States having industrial institutions.	Location of the institution. State.	Location of the institution. Town.	Number of industrial institutions.	Name of the institution
1	Alabama	Auburn	1	Agricultural and Mechanical College of Alabama
2	Arkansas	Fayettville	2	Arkansas Industrial University
3	California	Berkeley	3	University of California—Colleges of Science
4	Connecticut	New Haven	4	Yale College—Sheffield Scientific School
5	Delaware	Newark	5	Delaware College
6	Florida	Brevard County	6	Florida State Agricultural College
7	Georgia	Athens	7	University of Georgia, Georgia State College of Agriculture and the Mechanic Arts
		Dahlonega		University of Georgia, North Georgia Agricultural College
8	Illinois	Urbana	8	Illinois Industrial University
9	Indiana	La Fayette	9	Purdue University—Indiana Agricultural College
10	Iowa	Ames	10	Iowa State Agricultural College
11	Kansas	Manhattan	11	Kansas State Agricultural College
12	Kentucky	Lexington	12	Kentucky University—Agricultural and Mechanical College.
13	Louisiana	New Orleans	13	Louisiana State Agricultural and Mechanical College
14	Maine	Orono	14	Maine State College of Agriculture and the Mechanic Arts
15	Maryland	College Station	15	Maryland Agricultural College
16	Massachusetts	Boston	16	Massachusetts Institute of Technology
		Amherst	17	Massachusetts Agricultural College
17	Michigan	Lansing	18	Michigan State Agricultural College
18	Minnesota	Minneapolis	19	University of Minnesota, College of Agriculture; College of the Mechanic Arts
19	Mississippi	Oxford	20	University of Mississippi—College of Agriculture and the Mechanic Arts.
		Rodney	21	Alcorn University—Agricultural and Mechanical College
20	Missouri	Columbia	22	University of Missouri, Agricultural and Mechanical College
		Rolla		University of Missouri, Missouri School of Mines and Metallurgy
21	Nebraska	Lincoln	23	University of Nebraska—College of Agriculture
	Nevada			(No industrial institution established in the State)
22	New Hampshire	Hanover	24	Dartmouth College—New Hampshire College of Agriculture and the Mechanic Arts.
23	New Jersey	New Brunswick	25	Rutgers College—Scientific School
24	New York	Ithaca	26	Cornell University, College of Agriculture; Sibley College of the Mechanic Arts
25	North Carolina	Chapel Hill	27	University of North Carolina—College of Agriculture and the Mechanic Arts.
26	Ohio	Columbus	28	Ohio Agricultural and Mechanical College
27	Oregon	Corvallis	29	Corvallis College—State Agricultural College
28	Pennsylvania	Centre County	30	Pennsylvania State College
29	Rhode Island	Providence	31	Brown University—Agricultural and Mechanical Department.
30	South Carolina	Orangeburg	32	Claflin University—South Carolina Agricultural College and Mechanics' Institute.
31	Tennessee	Knoxville	33	East Tennessee University—Tennessee Agricultural College.
32	Texas	Bryan	34	Agricultural and Mechanical College of Texas
33	Vermont	Burlington	35	University of Vermont and State Agricultural College.
34	Virginia	Blacksburg	36	Virginia Agricultural and Mechanical College
		Hampton	37	Hampton Normal and Agricultural Institute
35	West Virginia	Morgantown	38	West Virginia University—Agricultural Department
36	Wisconsin	Madison	39	University of Wisconsin—College of Arts
	Total			

received the national endowment of land-scrip under the act of July 2, 1862.

Name of the president of the agricultural and mechanical college and of the university.	Number of professors and assistants in the agricultural and mechanical college for the collegiate year.	Number of students in the agricultural and mechanical college for the collegiate year.	Number of students in the agricultural and mechanical college pursuing agricultural or mechanical studies.	Number of graduates since the agricultural and mechanical college received the scrip or land granted by Congress July 2, 1862.	Number of professors and assistants in the university, including all the departments, for the collegiate year.	Number of students in the university, including all the departments, for the collegiate year.	Number of acres sold during the year of the scrip or land granted by Congress July 2, 1862.	Average price per acre of the scrip or land sold during the year.	Number of acres unsold of the scrip or land granted by Congress July 2, 1862.
Rev. I. T. Tichenor, D. D	8	88	49	16			(b)		
N. P. Gates, A. M	8	9	9	None	11	248			
John Le Conte, M. D	27	85	85	32	34	231			
Rev. Noah Porter, D. D., LL. D	29	224	224	284	89	1,051			
William H. Purnell, LL. D	8	42	17	22					
Hon. William Watkin Hicks, (president *ex officio.*)	(a)								
Rev. Henry H. Tucker, D. D., (chancellor.)	10 5	86 258	86 	26	22	487			
John M. Gregory, LL. D., (regent)	24	131	131	82	25	374	(c)		25,410
Abraham C. Shortridge	7			None	7	57			
A. S. Welch, LL. D	17	277	135	80			21,024	$2 22	176,975
Rev. John A. Anderson	15	237	237	22			2,080	6 25	32,505
John B. Bowman, LL. D., (regent)	8	95	25	148	32	260			
Maj. J. L. Cross	6	225	225	None					
Rev. Charles F. Allen, D. D	8	115	115	37					
Capt. William H. Parker	5	52	35	22					
John D. Runkle, Ph. D., LL. D	37	280	280	126					
William S. Clark, Ph. D., LL. D	11	111	111	98					
Theophilus C. Abbot, LL. D	14	156	156	123			4,799	3 08	164,416
William W. Folwell, M. A	10	9	9	3	16	237	4,954	5 49	55,003
General Alexander P. Stewart, (chancellor.)	7			None	12	102			
George B. Vashon, A. M	4	5	5	None	4	120			
Daniel Read, LL. D	13 6	41 101	41 101	40 5	32	491	80	3 50	328,429
Allen R. Benton, LL. D., (chancellor)	4	20	20	1	8	132	(d)		90,000
							(d)		90,000
Rev. Asa D. Smith, D. D., LL. D	14	29	29	21	37	479			
Rev. William H. Campbell, D. D., LL. D.	11	57	57	69	13	188			
Andrew D. White, LL. D	16 14	17 56	17 56	5 9	48	532	(e)4,800	5 87	409,200
Rev. Charles Phillips, D. D	5	7	7	None	7	70			
Edward Orton, Ph. D	11	100	75	None					
B. L. Arnold, A. M	6	60	60	20	6	155	700	2 50	89,300
Rev. James Calder, D. D	12	148	148	45					
Rev. E. G. Robinson, D. D., LL. D	13	40	40	Unknown	15	255			
Rev. Edward Cooke, D. D	2	20	20	None	5	209			
Rev. Thomas W. Humes, S. T. D	16	53	53	30	16	315			
	(a)								
Matthew H. Buckham, A. M	7	14	14	23	23	153			
Charles L. C. Minor, LL. D	7	222	222	12					
General Samuel C. Armstrong	19	201	128	113					
Rev. J. W. Scott, D. D., LL. D	5	15	15	None	12	125			
Rev. John Bascom, D. D., LL. D	14	17	17	10	27	345	2,848	1 15	52,403
	463	3,703	3,054	1,524	501	6,616	41,285	3 27	1,513,671

(*a*) This college has not been opened to students. (*b*) The States having blanks against them in this column have sold all their scrip or land. (*c*) This State has sold no scrip or land during the present year. (*d*) This State has sold none of the scrip or land granted by Congress July 2, 1862. (*e*) Acres of scrip or land sold by this State during the years 1874 and 1875.

FARM FACTS AND EXPERIMENTS.

EFFECTS OF FERTILIZERS.

Corn.—Professor Roberts, of Cornell University, for experiments in growing corn on the university farm, selected a sandy and clayey loam, underlaid by a stiff clay, with a fair natural drainage. The field was plowed and then harrowed twice, and hills were marked 3½ feet apart each way. The grain was planted May 3, and cultivated thrice. Plot 1, not thinned, returned, per acre, 146.6 bushels of ears; plot 2, thinned to four stalks in a hill, 125.3 bushels; plot 3, thinned to three stalks in a hill, 160.6 bushels. Plots 4 to 7, inclusive, were devoted to a trial of superphosphate. On plot 4, Ralston's superphosphate was applied in the hill at the rate of 300 pounds per acre. Plots 5 and 7 received nothing. Plot 6 received, per acre, 300 pounds of Ralston's superphosphate, applied on the surface. The superphosphate contained phosphoric acid, 10.85 per cent.; nitrogen, 3.7. The bushels, per acre, produced by the several plots, in the order above named, were: 113.76, 114.6, 109.3, and 112.87. Professor Roberts accounts for the non-beneficial effects of the superphosphate from the fact that at planting-time there was hardly moisture enough for germination, and the dressing of superphosphate acted as an absorbent of this already scanty moisture, retarding germination to such an extent that attention was attracted to the matter at the time.

Wheat.—At the Eastern Pennsylvania Experimental Farm, a piece of oat-stubble was plowed September 1, and, September 28, the fertilizers named in the table below were sown broadcast and harrowed in, except on plot 4, where the fertilizer was drilled in with the wheat. The applications cost $9 per acre, except on plots 3, 9, and 10. The wheat was drilled in at the same date at the rate of 1½ bushels per acre; it was cut July 9 and thrashed July 15. The following were the manurial applications and yields per acre.

Plots.	Kinds of fertilizers.	Pounds of fertilizers per acre.	Straw per acre, in tons of 2,000 pounds.	Bushels of wheat per acre.	Order of largest yield of grain.
1	Barn-yard manure	......	1.60	22.40	5
2	No fertilizers	......	1.40	19.44	13
3	Common salt	85	1.46	22.32	6
4	Acidulated S. C. rock, drilled in	600	1.76	25.20	1
5	Boston animal fertilizer	360	1.18	20.20	10
6	Nitrate of soda	164	1.20	20.16	11
7	Muriate of potash	300	1.22	20.32	9
8	Sulphate of ammonia	136	1.36	21.20	7
9	Ground bone, (double quantity)	......	1.56	24.04	3
10	Acidulated S. C. rock, (double quantity)	......	1.40	23.20	4
11	Acidulated S. C. rock	600	1.26	20.14	12
12	Bone phosphate	320	1.42	24.42	2
13	Ground bone	360	1.14	21.12	8

The season was very dry and the applications unremunerative in the immediate crop. The largest yield was from the fertilizer drilled in with the wheat. Concentrated fertilizers should be dissolved in water or mixed with other material. They should be applied early in the season, to facilitate assimilation by the plants.

Swedes.—The following experiment was made in 1874, in growing Swedes, on the farm of Mr. J. N. Fleming of Ayrshire, Scotland, on soil

dry and light, overlying the old red sandstone. Plot 2 received about 25 tons of well made farm-yard manure per acre; plots 3, 4, 5, and 6, 4 cwt. Peruvian guano and 4 cwt. bone-meal per acre; plot 7 received the same amount of farm-yard manure as plot 2 and 2 cwt. per acre each of dissolved Peruvian guano, crushed bones, bone-meal, dissolved bones, and common salt. The crop was valued at 15 shillings per ton. Only in the case of plot 6 was the value of increased product (of the first year) equal to the cost of the fertilizer, though plots 4 and 7 failed only by the merest fraction.

Plots.	Manures.	Cost of manure per acre.	Weight of crop per acre.	Value of crop per acre.	Increase in value per acre of crop from manure.
		£ s. d.	Tons. cwt. qrs.	£ s. d.	£ s. d.
1	No manure	....	13 15 0	10 6 4	....
2	Farm-yard manure	6 10 0	21 11 3	16 3 9	5 17 5
3	Dissolved Peruvian guano	4 10 0	17 12 0	13 4 0	2 17 8
4	Dissolved bones	4 10 0	19 5 0	14 8 9	4 2 5
5	Bone-meal	4 10 0	17 12 0	13 4 0	2 17 8
6	Mixture of 3, 4, and 5	4 10 0	20 7 0	15 5 3	4 18 11
7	Farm-yard manure and other fertilizers.	10 7 0	27 10 0	20 12 6	10 6 2

Grass.—At the Eastern Pennsylvania Experimental Farm, in an experiment in fertilizing "first timothy and clover," the fertilizers were applied at the rate of nine dollars' worth per acre, being sown broadcast, April 14, 1875. The grass was cut June 29, and was weighed and put up on the following day. The table gives applications and results.

Fertilizers.	Hay per acre, in tons of 2,000 pounds.	Increase of hay per acre from the fertilizer.	Order of largest yield.
Nitrate of soda	0. 440	0. 048	10
No manure	0. 392	....	11
Sulphate of ammonia	0. 940	0. 048	6
Barn-yard manure	0. 748	0. 356	8
Bone superphosphate	0. 872	0. 480	7
Waring's fine-ground bone	1. 200	0. 808	4
Acidulated S. C. rock	1. 020	0. 628	5
Muriate of potash	0. 940	0. 548	7
Philadelphia star-brand bone	0. 672	0. 280	9
Baugh's challenge superphosphate	1. 560	1. 168	2
Acidulated S. C. rock, Chemical Company, New Jersey	1. 636	1. 244	1
Cope's ammoniated superphosphate	1. 500	1. 108	3

The small result of the manure is due to the drought and to its being unfermented and applied in the spring instead of the fall.

Barley.—Mr. J. B. Lawes, made the following experiments with barley, at Rothamsted, in 1874, the twenty-third consecutive year on the same land. The soil is a heavy loam, with a clay subsoil, resting on chalk, at a depth of 8 to 12 feet. (See report of the Department for 1873, page 295.) The superphosphates, were at the rate of 392 pounds per acre; ammonia salts, 200; nitrate of soda, 275; rape-cake, 1,000; sulphate of potash, 200; sulphates of soda and magnesia, 100 pounds each per acre.

Plots.	Fertilizers.	Bushels of grain per acre.	Pounds per bushel.
2 AA	Superphosphate and nitrate of soda	53⅞	54
4 C	Superphosphate, rape-cake, sulphates potash, soda, and magnesia	49¼	57
2 C	Superphosphate and rape-cake	48⅞	57½
4 AA	Superphosphate, nitrate of soda, sulphates potash, soda, and magnesia	47⅝	57
4 A	Superphosphate, ammonia salts, sulphates potash, soda, and magnesia	45¾	57½
2 A	Superphosphate and ammonia salts	42⅛	54¼
2 O	Superphosphate alone	21⅜	55

For the twenty-three years, the average annual yield per acre, resulting from application of superphosphate and ammonia salts, (or 275 pounds of nitrate of soda in place of the latter,) was 49 bushels; from superphosphate and ammonia salts (or nitrate of soda) and sulphates of potash, soda, and magnesia, 48¾ bushels; from superphosphate alone, 24¾ bushels; from 14 tons of farm-yard manure, per acre, 48⅞ bushels. The following estimate is given of cost of production of barley per acre: Rent and rates, £1 12*s*.; 2½ bushels of seed, 12*s*. 6*d*.; 3½ cwt. superphosphate, £1 1*s*.; 2¼ cwt. nitrate of soda, £1 16*s*.; hoeing twice, 7*s*.; plowing, harrowing, drilling, harvesting, thrashing, and taking to market, £3 5*s*.; total cost, £8 13*s*. 6*d*. Product, per acre, 48 bushels of barley, worth £13 4*s*.; 3 bushels of refuse grain, 12*s*.; 1½ tons of straw, £1 10*s*.; total, £15 6*s*., showing a profit of £6 12*s*. 6*d*. per acre.

The following exhibit is for a field which, prior to 1873, had given six crops in succession of wheat, oats, and barley—the last five crops with artificial manures. In 1873, it was unmanured; one half was in barley, the other half was in clover, which had been sown with the barley in 1872. In 1874, the whole field was in barley. In 1873, the product, per acre, of barley, was 31 bushels; of clover-hay, 54 cwt. In 1874, barley following barley produced 32¾ bushels per acre, while barley following clover produced 58 bushels per acre; only 5¾ bushels per acre less than the total of the two successive crops on the other half.

On poor soil.—Professor Storer, of the Bussey Institution, raised barley and beans on poor land fertilized with farm-yard and stable manure, superphosphates, different kinds of lime, wood-ashes, potash-salts, fish-scrap, and various nitrogenous fertilizers, in continuation of trials commenced in 1871.

The experimental area comprised about two acres of table-land, at the top of a ridge of drift or glacial gravel, the soil a thin layer of loam, resting on a deep bed of coarse, open gravel, in which no constant supply of water can be obtained by sinking wells until a depth of 50 or 60 feet is reached. The soil is very homogeneous, and excepting a small piece at one end of the field much richer than the remainder, is typical of the thin, light, leachy soils frequently found overlying a gravelly drift in New England. In April, 1871, the land was plowed to the depth of 4 inches, harrowed, and cross-harrowed. The field was then laid out in four main divisions, which were again divided into sections, and these into squares, each containing about $\frac{1}{162}$ of an acre of land. Each main division was treated with some one class of fertilizers, but on the squares the fertilizers were varied with reference to the kind of crop grown. On one main division were tried various limes and lime-mixtures, including spent lime from gas-works and soap-works, lime and salt-mixture, and oyster-shells ground to the fineness of flour. The purpose was to test the effect of heavy and repeated liming on poor, drift soil. On the second

division, potash compounds, fish-scrap, Peruvian guano, and sulphate of ammonia were contrasted with farm-yard manure, and manure from Boston stables. On the third division were applied superphosphates of lime, bone-flour, Peruvian guano, &c., and on the fourth division were tried various chemical nitrogenous manures.

The heavy manures, such as stable-manure, peat, lime, ashes, and leather-scraps, were spaded under; the bone-meal, fish-scrap, guano, and oil-cake, were raked in; the superphosphates, and various salts and chemical manures, were simply mixed with a portion of the earth of their respective squares and then spread on the surface of the ground without spading or raking. The barley was sown toward the close of April, at the rate of two bushels per acre; the beans, in drills, early in May.

The exhibits of the various seasons were largely influenced by differences in climatic conditions. In 1872, the soil was badly leached and the crops much injured by a long succession of storms, and in 1873 the barley was almost ruined by prolonged summer drought, although the beans yielded a good crop. The experiments showed that the land, not being suitable to high farming, could profitably utilize only moderate quantities of manure. Considering the question of improvement in the soil from an economical stand-point, it is held that the only sure way to bring the land up is by means of irrigation, which could be accomplished by pumping water from a valley on one side of the field or from a brook on the other side.

Very good products were realized from potassic manures in conjunction with dung, as the land demanded potash more than either phosphoric acid or nitrogen. Potassic manures, applied alone, rendered available nitrogen already in the soil. The following selected particulars of crops of 1874 do not include products of the exceptionally rich piece of land lying at one end of the field. No data concerning cost of the shell-lime and crushed shells are given.

Plots.	Description of fertilizers.	Amount of fertilizers per acre.	Cost of fertilizers per acre, respectively.	Total cost of fertilizers per acre.	Product per acre.	Gain per acre over product of unmanured.
	BARLEY PLOTS.				*Bushels.*	*Bushels.*
1	Nitrate of soda	406.8 pounds	$15 25	$26 56	39.5	34.1
	Sulphate of potash	165.3 pounds	4 95			
	Coe's superphosphate	254.5 pounds	6 36			
2	Wood-ashes	33 bushels	9 90	19 85	38.4	33.0
	Fish-scrap	1,105.8 pounds	9 95			
3	Wood-ashes	20.6 bushels	6 18	20 32	34.8	29.4
	Sulphate of ammonia	235.7 pounds	14 14			
4	Fish-scrap	1,105.8 pounds	9 95	14 90	30.0	24.6
	Sulphate of potash	165.3 pounds	4 95			
5	Oyster-shell lime	4,875.5 pounds			9.6	4.2
6	No manure				5.4	
7	Crushed oyster-shells	4,875.5 pounds			3.8	Loss 1.6
	BEAN PLOTS.					
1	Nitrate of soda	398.2 pounds	14 93	26 82	32.7	27.3
	Sulphate of potash	218.2 pounds	6 54			
	Fine bone-meal	178.5 pounds	5 35			
2	Nitrate of soda	402.5 pounds	15 09	29 34	31.1	25.7
	Sulphate of potash	218.2 pounds	6 54			
	Coe's superphosphate	308.9 pounds	7 71			
3	Fish-scrap	1,105.8 pounds	9 95	16 49	27.6	22.2
	Sulphate of potash	218.2 pounds	6 54			
4	Wood-ashes	27.2 bushels	8 16	18 11	26.7	21.3
	Fish-scrap	1,105.8 pounds	9 95			
5	Wood-ashes	27.2 bushels	8 16	22 30	19.2	13.8
	Sulphate of ammonia	235.7 pounds	14 14			
6	Unmanured				5.4	
7	Crushed oyster-shells	4,875.5 pounds			2.8	Loss 2.6

The applications of nitrate of soda were unnecessarily large, and probably might be profitably replaced by some cheaper nitrogenous fertilizer, such as fish-scrap or flesh-meal. Plot 4, barley, and plot 3, beans, are not fully comparable with the other tabulated plots, as these two squares were suffering from injury received in previous years. Two squares in barley, the one fertilized with 10¼ cords of fresh cow-manure per acre, and the other with 10⅛ cords horse-manure per acre, from city stables, gave nearly equal products, averaging 29.6 bushels per acre, against 6.9 bushels per acre from unmanured soil in the same section, a gain of 22.7 bushels. Two bean-plots, manured in the same manner, averaged 33.8 bushels per acre.

Applications of superphosphate alone did not give encouraging results. Professor Storer remarks that bone-dust and other phosphates, when applied in large quantity, tend to injure the development of the first shoot from the seed, especially in poor soil. In contrast with the unfavorable experience with superphosphate alone on this poor, gravelly soil, it is stated that in a neighboring old garden-soil of deep loam and long under cultivation, the yield of beans, pease, and potatoes was decidedly increased in 1872 by the application of a mixture of soluble and insoluble phosphate of lime and fish-scrap. Applications of fish-scrap alone on the poor, experimental field did not give favorable results. In regard to certain mixed fertilizers, Professor Storer says:

It would seem to be far more reasonable to use moderate quantities of stable-manure in conjunction with artificial fertilizers than to apply large quantities of the dung by itself. There are undoubtedly certain valuable qualities that are peculiar to stable-manure, notably its power of diffusing nitrogen compounds in the soil, and of loosening and mulching the land. It is important, of course, that these peculiarities should be clearly recognized, and made the most of; but in so far as concerns the carrying of potash and of phosphoric acid to the land, it does not appear that the dung of animals has any special merit. In this respect it is probable that dung is but little, if any, better as a manure than the plants from which it was formed; and it is probably true that, in the vast majority of cases, the real efficiency of barn-yard manure would be increased by the addition of a certain proportion of soluble potassic and nitrogenous fertilizers, and by dressing the land beforehand with a true superphosphate. Just as the mulching and diffusive power of the stable-manure would tend to increase the efficiency of a mixture of artificial fertilizers, so the ready solubility and diffusive power of the latter—their so-called activity—would enable the crop to use the constituents of the dung more fully than would otherwise be possible.

FURTHER CONCERNING FERTILIZERS.

Phosphoric acid.—Professor Storer says that in any part of the country readily accessible from a seaport, soluble phosphoric acid should not exceed 13 cents, currency, per pound, when purchased in considerable quantity. He gives the offer of a responsible New York dealer to sell superphosphate containing 10 per cent. of soluble phosphoric acid at a price which would make one pound of this constituent cost 12½ cents, in lots of ten tons, or more, of superphosphate. He adds that the farmer may, with advantage, manufacture his own superphosphate, subjecting to the action of sulphuric acid the bone-black, obtainable from sugar-refineries, or from dealers in fertilizers; also that a valuable fertilizer may be produced by decomposing raw bones by means of wood-ashes, or some other alkali. He directs attention to the recommendation of Mr. J. B. Lawes, that farmers buy the simple fertilizers separately, compounding them on the farm as circumstances may demand. It is common to find in our markets "superphosphates" in which fish-scrap or other cheap and relatively inferior nitrogenous material has been largely employed. The farmer should procure a simple, pure superphosphate and the nitrogenous material separately, and mix them himself. Thus, he may avoid paying for fish-scrap a price which is suitable only for substances affording a more active nitrogenous element.

German potash-salts.—Professor Goessman, State inspector of fertilizers in Massachusetts, remarks that the sulphate of potash compound is the safest, in case it be determined to use one single form of potash for a variety of crops. Chloride of potassium is objectionable for potatoes and tobacco; but it is highly recommended for grass and for all kinds of forage and grain crops, particularly when applied in connection with phosphates. The agricultural value of German potash compounds is liable to be affected very greatly by the presence of certain salts associated with them in the mines. The most prominent among these are sodium chloride (common salt) and magnesium chloride. A large admixture of common salt, of which some of these low-grade fertilizers contain 40 to 50 per cent., renders the compound unprofitable for use on some important crops. Magnesium chloride is quite objectionable for its action on plant-growth, and for other reasons.

The process of manufacturing the higher grades of the potash salts aims at the exclusion of both common salt and magnesium chloride, and therefore these are safer as fertilizers than the lower grades. An admixture of magnesium sulphate in most cases increases the agricultural value of these fertilizers. The following is a statement of prices paid by farmers, in 1874, in New York City, for one pound of potassium oxide, when buying the potash salts by the ton:

Name of fertilizers.	Percentage of potassium compound.	Price per ton.	Cost of one pound of potassium oxide.
			Cents.
Sulphate of potassa	35	$30	8.00
Sulphate of potassa	80	90	9.26
Muriate of potassa	80	65	6.05
Nitrate of potassa	95	165	10.00

The latter contains 13 per cent. of nitrogen which, at 30 cents per pound, gives a nitrogen-value of $78 per ton of the fertilizer. Farmers are advised, as a general rule, to use the lower grades of the potash salts only for forage crops.

Home-made superphosphate.—Mr. W. Newton, of Monroe County, New York, states that for the last ten years he has manufactured his own superphosphate. He has of late made use of fine bone-black, resulting from the grinding of bones burned in close vessels, (for filtering purposes.) He used about 65 pounds of vitriol and ten or eleven pailfuls of water to every 100 pounds of the bone-black. His mode of preparation is substantially as follows: He takes a suitable vessel for mixing, for example, a half of a molasses hogshead, which will allow the mixing of a somewhat larger quantity than that just indicated. He pours in at first twelve to fourteen pailfuls of water; then 80 to 90 pounds of the oil of vitriol is poured slowly into the tub, care being taken against spattering the vitriol on one's clothes. About 125 pounds of bone-black are now added, a small quantity at a time, one person attending to this while another is constantly stirring the mixture to prevent the bone-black from settling in large cakes. Such cakes are with difficulty penetrated by the acid, and are not easily broken. If too much bone is put in at once, there is danger that the mixture will boil over, and a part be wasted. After the material has been thoroughly worked together, the mixture is covered closely to retain heat and prevent evaporation of the vitriol. A thorough combination of the constituents will take place more or less quickly, according to the weather, varying from a day or

two, in warm weather, to perhaps as many weeks, when the temperature is low. When the mixture is removed from the tub, it resembles soft mortar in consistency. For drying, Mr. Newton finds it convenient to use a wagon-box, across which he places pieces of scantling, and over these a platform of matched boards, and on the latter the wet mass is placed. Around this platform are nailed strips of board 3 or 4 inches wide, so that none of the superphosphate will be blown off when exposed to the wind. In case of rain, the whole is easily drawn under cover. Exposure to rain must be guarded against, or there will be waste of the most valuable part of the fertilizer. Gypsum assists the drying of the fertilizer, but causes it to become harder in the lump, and more difficult of reduction to fineness. The only difficulty he has found is in the pulverizing of the preparation, as it is inclined to be gummy, and will clog any ordinary mill. He has succeeded best by thrashing with a flail and screening, the screen being about the size of that used for wheat in an ordinary fanning-mill. The first thrashing, a light one, makes about one-half of the superphosphate fine enough to pass the screen. A second thrashing and screening removes half of the residue, and a third course removes half of that left by the second. The remainder from the third course is difficult of pulverization, and cannot be sown with a drill. It is, therefore, applied by hand to some suitable crop, for example, corn or potatoes. For the bone-black may be substituted bones burned in heap till white. In this case, the current rule requires 87 pounds of oil of vitriol for 100 pounds of bone-white; but Mr. Newton advises the use of a somewhat smaller quantity of the acid, lest it be not all taken up by the bone, and there be injury wrought to substances coming in contact with the mixture when applied. Although the ammonia of the bones is lost in burning, an unadulterated superphosphate is obtained by the process of preparation, and, if desired, ammonia can be supplied by adding barn-yard manure. Mr. Newton adds that there had been a great desire for information on the subject in his vicinity, and that his experience had proved of much assistance to neighboring farmers.

Manufacture of fish-guano.—The following statements are from a report of the United States Menhaden Oil and Guano Association, composed of manufacturers of menhaden oil and fish-guano in Maine, Massachusetts, Rhode Island, Connecticut, Long Island, and New Jersey: Fish caught in 1874, 1,478,634 barrels, averaging 250 fish per barrel; excess of catch over that of 1873, 285,534 barrels; amount of fish-guano made in 1874, 50,976 tons; excess over 1873, 14,677 tons, or 40 per cent; oil made in 1874, 3,372,837 gallons; excess over 1873, 1,158,037 gallons, or 52 per cent.; factories employed in 1874, 64; men, at the factories, 871; fishermen, 1,567; sailing-vessels, 283; steamers, 25; capital invested in the business, $2,500,000, being an increase over 1873 of $112,000. A foreign market has recently been opened for fish-guano, and cargoes have been shipped from Maine ports to Liverpool.

Valuation of manure.—Mr. J. B. Lawes remarks that when the farmer uses purchased feeding-stuffs, or the salable produce of his farm, for fattening stock, the increased value of the animals is seldom, if ever, equal to the cost of the food consumed. His net profit comes from the manure produced.

Hundreds of experiments at Rothamsted with different kinds of food show that, weight for weight, there is much less difference in the feeding-value than in the manure-value of such foods as may, in a general sense, be classed together. It will make comparatively little difference, so far as increase of live-weight is concerned, whether a ton of cake of

Indian meal or of barley be given to fattening oxen or sheep, and comparatively little whether a ton of clover-hay or of meadow-hay be used. But within each class of food there would be a wide difference in the value of the manures which several kinds would produce. Furthermore, it is an error to assume that the manure-value of foods bears a proportion to their cost; in other words, that foods of the same market-price per ton will necessarily return manures equal, or nearly equal, in value.

Mr. Lawes gives the following table of estimated value of manure obtained in English practice by consumption of food, it being understood that each kind is of good quality, and that the resulting manure reaches the soil and crop without material loss:

Kind of food.	Value of manure per ton of food.	Kind of food.	Value of manure per ton of food.
	£ s. d.		£ s. d.
Cotton-seed cake, decorticated	6 10 0	Wheat	1 13 0
Rape-cake	4 18 6	Malt	1 11 6
Linseed-cake	4 12 6	Barley	1 10 0
Cotton-seed cake, not decorticated	3 18 6	Clover-hay	2 5 6
Lentils	3 17 0	Meadow-hay	1 10 6
Beans	3 14 0	Bean-straw	1 0 6
Tares	3 13 6	Pea-straw	0 18 9
Linseed	3 13 0	Oat-straw	0 13 6
Pease	3 2 6	Wheat-straw	0 12 6
Indian-meal	1 11 0	Barley-straw	0 10 9
Locust beans	1 2 6	Potatoes	0 7 0
Malt dust	4 5 6	Parsnips	0 5 6
Bran	2 18 0	Mangold-wurzel	0 5 3
Coarse pollard	2 18 0	Swedish turnips	0 4 3
Fine pollard	2 17 0	Common turnips	0 4 0
Oats	1 15 0	Carrots	0 4 0

It is to be remembered that in England meadow-hay signifies hay of good quality, and not the inferior product known by that name in many parts of this country. Comparing the exhibits, we find the value of manure from meadow-hay and from Indian meal to be two-thirds of that from clover-hay; from bean-straw, not quite one-half; oat-straw, nearly one-third; wheat-straw, more than one-quarter; potatoes, a little more than one-seventh; carrots, about one-tenth, and from decorticated cotton-seed cake nearly three times that from clover-hay.

The table is given, not as exhibiting precise comparisons of value for American practice, but as illustrating certain principles of feeding and enforcing a just appreciation of value of the manure resulting from fattening stock.

Mineral phosphates in France.—M. de Molon, the French statistician, estimates the amount of pulverized mineral phosphates annually applied to French farm-lands at 150,000 to 200,000 tons. Average price, on delivery, 50 francs, or $10, per ton. The departments of Ardennes, Meuse, Marne, Upper Marne, and Yonne are leading sources of supply, containing large beds of the phosphates, regularly stratified, and capable of easy working.

Shipment of buffalo-bone from Kansas.—Mr. M. L. Sargent, general freight agent of the Atchison, Topeka and Santa Fé Railroad, informs us that there were shipped over that road, in 1873, 2,743,100 pounds of buffalo-bones; in 1874, 6,914,950 pounds. We are also informed by the general freight agent of the Kansas Pacific Railway that in 1874 there were shipped over that road and its branches 158 car-loads, or 3,160,000 pounds. Thus, calculating the ton at 2,000 pounds, 5,037 tons of buffalo-

bones were gathered and shipped in 1874 from the regions opened by these roads. There were shipped over the Atchison, Topeka and Santa Fé road of buffalo-products, in 1873, 5,180,480 pounds of hides and 1,617,600 of meat; and in 1874, 1,374,300 pounds of hides and 632,800 of meat.

MISCELLANEOUS EXPERIMENTS.

Feeding cattle.—Professor Atwater, in stating the results of German experiments in cattle-feeding, exhibits the following points: Considerable quantities of easily-digestible substances rich in nitrogen, as bran, beans, pease, oil-cake, brewers' grains, and malt-sprouts, added to crude fodder-materials, cause no change in the digestion of the latter. As large a percentage of both albuminoids and carbo-hydrates of hay was digested by oxen, cows, and sheep when the hay was mixed with gluten, bran-meal, or rape-seed, and linseed-cake, as when the hay was fed alone. But when non-nitrogenous substances, as starch or sugar, or easily-digestible foods containing much of these and little nitrogen, are added in considerable quantity to crude foods, as hay, straw, and clover, the digestion of these latter is diminished. It is not merely the carbo-hydrates, but rather the albuminoids of the hay, whose digestion is obstructed by the addition of the carbo-hydrates. Professor Wolff concludes, from his experiments, that when hay and potatoes are so mixed that the dry substance of the potatoes is not more than one-eighth of the whole dry substance in mixture, the hay is digested as when alone. But if the dry substance of the potatoes be one-fourth of the whole dry substance, the digestion of the hay will be 5 per cent. to 10 per cent. less, and if the proportion of dry substance of the potatoes be as one-half of the whole dry substance, then the diminution in the digestion of the hay will be from 10 per cent. to 20 per cent. The decrease of digestion of hay resulting from the use of turnips in like proportions of mixture will be only half to three-quarters of that caused by potatoes in mixture. Straw and chaff suffer much more loss through imperfect digestion than hay and clover when mixed with easily-digestible carbo-hydrates. Straw and chaff contain relatively small percentages of albuminoids and large percentages of carbo-hydrates, and when more carbo-hydrates are added the effect is to diminish digestion of both crude fiber and albuminoids. The value of straw, corn-stalks, and chaff as fodder for stock is generally much underrated by American farmers. One reason for this is that the gathering of such crops is often delayed till they become quite indigestible. To utilize these materials, they should be mixed with others rich in nitrogen, clover, bean and pea-meal, bran, oil-cake, and the like. "Middlings," "fine feed," Indian-meal, or, indeed, roots, may be used with straw and similar foods, though less rich in nitrogen than the materials before named; although not proven by direct experiment, it is inferred that they would not secure so complete a digestion of the straw and stalks as would the more nitrogenous foods.

Hogs.—The following are leading points in a recent paper by Professor Miles, of the Michigan Agricultural College, on his experiments in feeding hogs on raw corn-meal in 1868 to 1871: The leading object in view was to obtain a reliable standard of value with which to compare the results of experiments with corn in other forms, and when mixed with other foods. But the experiments afford useful data respecting the influence of the age and ripeness of the animal on the amount of food consumed and on the increase of live-weight from the food. They "show that the animal capable of eating the most is the most profitable, provided the digestive organs are capable of assimilating the large amount of food and converting it into animal products." In the follow-

ing summary of results no exhibit is presented for the first actual week of feeding on raw meal, that week being considered exceptional, as quite a number of the young animals did not eat full rations when first put on this diet. The table gives averages for groups under six months, over six months, and of all ages:

Periods.	Ages.	Pounds of meal consumed per week for each 100 pounds of live-weight.	Pounds of meal required to produce 1 pound of increase of live-weight.
First period	Under six months	33.52	3.86
	Over six months	17.74	3.91
	All ages	20.45	3.93
Second period	Under six months	26.60	3.81
	Over six months	19.07	4.08
	All ages	20.57	4.00
Third period	Under six months	23.22	4.55
	Over six months	17.23	4.64
	All ages	18.50	4.61
Fourth period	Under six months	21.27	5.71
	Over six months	15.19	6.59
	All ages	15.94	6.43
Average of first three periods	Under six months	26.54	4.08
	Over six months	17.83	4.22
	All ages	19.57	4.19

"It was undoubtedly a mistake to put such young animals at once on a full feed of new meal. They should have been fed smaller amounts for several days before commencing the experiment, to give their digestive organs a chance to adapt themselves to the new situation." Attention is called to another fact, namely, that during the second, third, and fourth weeks of the first period, 18.58 pounds of meal were consumed for each 100 pounds of live-weight, and that 4.57 pounds of meal were required for 1 pound of increase in live-weight, the average of consumption per week for each 100 pounds of live-weight being greater than the average cost per week for the entire period. A greater amount of meal was required to make 1 pound of increase in live-weight. The probable explanation is that during the first week of this period the older animals were able to assimilate all the meal consumed, and that afterward their digestive organs became overtaxed, (although their health was not affected to such a degree as to impair appetite,) so that they were unable to assimilate their food so thoroughly and to lay up so large a proportion of it in increase of weight as during the first week of the period.

Wheat drilled and broadcast.—At the Eastern Pennsylvania Experimental Farm plots of one-eighth of an acre each were plowed September 3, 1874, and Fultz wheat was sown September 28, the soil all fertilized alike.

Seed per acre.	Straw per acre, tons of 2,000 pounds.	Bushels of grain per acre.
Two bushels of seed, drilled	1.68	16.66
One and a half bushels of seed, drilled	1.28	14.46
Two bushels plowed in shallow	1.68	21.00
Two bushels broadcast and harrowed in	1.60	22.78

Experiments in former years have favored broadcast sowing. It is proposed to make a change in the method of drilling, and to make use

of a new drill-tooth which distributes the seed over a space about 4 inches wide. With such a drill, there could be a liberal seeding per acre, with less liability to crowd the seed in the row than now.

Sampling fertilizers.—Dr. Märcker, of the Halle experimental station, took a sample for analysis from a bag of fertilizer; after the latter had been subjected to two hours transportation, another sample was taken by him from the bag. There was a difference of 2 per cent. of soluble phosphoric acid between the two exhibits of analysis. It appeared that during conveyance some of the finer particles of the fertilizers had settled downward and coarser had worked to the top.

Effects of soil and manure on sugar-beets.—The following is an abstract of recent experiments by M. Deherain and M. Fremy, president of the Paris Academy of Sciences, in examining the influence of soil and manures on the size and saccharine quality of sugar-beets: Holes were bored in the sides and bottoms of a large number of tubs, and in each was placed a layer of gravel, to allow water of irrigation to drain off. The tubs then received various kinds of artificial soils—pure sand, limestone, and clay, exempt from potash. Beet-seed was sown in May, procured from the Aisne, where it produces roots containing 11 to 13 per cent. of sugar. The manures employed, either separately or mixed, were sulphate of ammonia, nitrate of potash, nitrate of soda, chlorides of potash and soda, superphosphate of lime, guano, rasped horn, and stable-dung. Irrigation was generally with the ordinary water of Paris, but sometimes with distilled water, in order to avoid the salts of the common water, and sometimes with water containing chemical manures. We present leading points of results: Roots are capable of attaining a weight of 1.4 pounds to 1.6 pounds in artificial soils wholly devoid of humus, provided they are regularly watered and supplied with chemical manures; while, in the absence of such manure, if the artificial soil be merely watered with distilled water, the roots will hardly attain an ounce in weight. Nitrogen, in the form of nitrate of soda or of potash, or of sulphate of ammonia, &c., favors increase of size of root, but is liable to injure the saccharine quality of the crop. Beets growing in a well-manured soil, and having combined nitrogen within reach, tend to form albuminous substance at the expense of the sugar. Beet-roots containing less than 10 per cent. of sugar are often found to contain twice as much nitrogen as those which have a saccharine richness of 15 to 16 per cent. On the same principle, in certain soils beet-roots will exhibit but little sugar, not because the soil has become impoverished, but because, on the contrary, it is too rich in nitrogen. Beet-roots grown in artificial soils, and watered with chemical manures, are found to reach as high as 18 per cent.

Composition of sugar-beets.—A late German report of investigations on the composition of sugar-beets in various stages of maturity presents the following figures of percentage at different dates:

	July 19.	August 17.	September 1.	September 21.	October 4.	October 12.
Water	86.1	85.2	84.4	84.8	83.9	83.5
Cellulose and pectin	8.1	7.4	6.7	5.6	5.7	5.9
Sugar	2.5	4.5	6.5	7.1	8.8	9.1
Albuminoids and undetermined matters	2.4	1.9	1.4	1.3	0.7	0.7
Ash	0.9	1.0	1.1	1.3	0.9	0.8

Attention is directed to the regular manner in which the percentage of sugar increases as the root matures, and to the relative diminution of the other constituents. In order to obtain mature roots, a point of great importance, continental cultivators plant early and avoid stimulating manures, which would tend to undue size of roots and tardy maturing.

Shallow and deep plowing.—In the report for 1874, page 258, will be found an abstract of experiments in corn culture on the Wisconsin University farm during the years 1871–'73, in testing the effects of different depths of plowing on nearly level clay-land, having a stiff clay subsoil. It was shown that the deep plowing was the more advantageous in very dry seasons, but in other years the shallow, owing to the want of drainage and of outlet for the superfluous water which flowed on the retentive soil. These defects were remedied in the fall of 1873 by laying an underground drain through each of the plots. The following table includes the results of 1874, a dry season. The yield is given in bushels of ears, 75 pounds to the bushel:

Method of cultivation.	1871.	1872.	1873.	1874.
	Bushels.	*Bushels.*	*Bushels.*	*Bushels.*
Plowed five inches deep	55.4	43.5	53.4	53.0
Plowed twelve inches deep	50.6	50.3	52.8	58.1
French-plowed, eighteen inches deep	44.9	54.7	51.3	65.3
Subsoiled eighteen inches deep	52.2	56.8	51.1	60.8

Cutting seed-potatoes.—The superintendent of the Eastern Pennsylvania Experimental Farm states that in trials from 1868 to 1873, inclusive, in planting quartered potatoes, seed-end and stem-ends of potatoes, he found no marked difference in results from these various styles of seeding.

Selection of seed-corn.—Professor W. W. Daniells reports experiments on the Wisconsin University farm in 1874, in planting corn from tips, butts, and middle of the same ears, raised from seed selected in like manner. These experiments were in continuation of trials in the four preceding years. The experience of the five years exhibited no substantial difference in the crops grown from these different selections of seed.

Nitrogen of vegetable mold.—Professor Storer reports experiments illustrating the value of the nitrogenous plant-food afforded by the humus of our peats and mucks. The quality of the nitrogenized constituents of vegetable mold depends greatly on the climate in which the mold is formed, and on accompanying conditions of moisture. In New England, many kinds of peat, which are considered of little value as manure when applied directly, produce clearly beneficial effects after being mellowed by exposure to the weather. In Northern Europe, even on soils highly charged with humus, the natural supplies of nitrogen are quite inadequate to the growth of large crops of grain; the climate does not supply the amount of heat and evaporation which in milder regions are, without the aid of stable-manure or artificial fertilizers, sufficient to the utilization of the nitrogen of the humus.

Wood-ashes.—From Professor Storer's reports of experimental investigations at the Bussey Institute are taken the following points: On analyzing thirteen fairly-selected specimens of household ashes from wood of various kinds, chiefly hard-wood, their average proportion of potash was found to be 8½ per cent. by weight. Overestimates of the

proportion of phosphoric acid existing in ashes from household fires have been quite common, having been favored by analyses of laboratory ashes, which are not so much exposed to loss of this constituent as those from domestic fires. In this connection is pointed out the advantage that the compost-heap has over fire as an agent for manurial reduction of coarse vegetable material, such as weeds, clods, chips, and brush-wood, in that composting avoids waste of the nitrogen of these substances at the same time that it preserves all the phosphoric acid and other inorganic matters.

Much of the fertilizing action of leached ashes is attributable to their lime and magnesia compounds; it cannot the small amount of phosphoric acid existing in these ashes.

A marked contrast appears in the efficiency of wood-ashes on many New England soils and the success of limited trials of potash-salts in these regions, as compared with the frequent failure of potash applications on English soils, set forth in the experimental statements of Mr. Lawes. The explanation is that the soil conditions of the contrasted cases are quite different. For more than a century, on most of the best farm-lands of Europe the straw of the crops has been regularly returned to the land, while the opposite has been the practice on American soils. The old lands of our Eastern States have become exhausted of their potash, through its removal in straw; therefore, potash applications have a marked effect in renewing the productiveness of these lands, not only supplying potash, but also liberating and rendering available nitrogen which had been held inactive in soil combinations. In the one class of cases potash has been constantly restored to the land by means of straw fed to animals, and, as a consequence, the potash manures will not give any substantial increase of crops; in the other class of cases the conditions are reversed.

With regard to English and German experiments, it is remarked that the most of these have been on comparatively fertile soils, and that therefore they have little direct applicability to the solution of the agricultural problems of New England. An illustration of the peculiar manurial requirements of different regions is afforded in the fact that, in certain districts of France, especially Brittany, spent bone-black returns excellent results as a manure, and even fresh bone-black and descriptions of waste bone-black containing no nitrogen. The application of bone-black alone is peculiar to these regions, and elsewhere finds little favor. The explanation of this sectional preference is that the indicated districts possess clayey or gravelly soils, which have been formed by the disintegration of rocks rich in potash. While this element is abundant, there is a deficiency of phosphates, and this deficiency is remedied by applying the bone-blacks, those containing no nitrogen being used on the new lands, and those charged with blood and other albuminous matters being applied to lands exhausted by long cultivation.

The following observations are made on the action of night-soil and stable-manure: While farmers near Boston highly esteem long horse-manure from the city stables, notwithstanding its large proportion of straw and the loss of nitrogen which it has suffered, night-soil is not in much demand, and the larger part of that produced in the city finds its way to the sea. The farmers allege that the night-soil is too forcing. This discrimination in favor of the stable-manure has this foundation, that this manure contains considerable potash, while the contrary is the case with night-soil, the product of the bread, meat, and vegetables consumed as human food. And the more the original horse-manure has

been wasted by fermentation the larger the proportion of potash in the residue. Applications of night-soil tend to withdraw rapidly from the soil its available potash. Some skillful farmers near the city mix the strawy horse-manure with the night-soil. Although they often allege other reasons for this procedure, its philosophy lies in the fact that thus is formed what may be relatively called a complete manure. There is a probability that the Stassfurt potash salts or wood-ashes would answer an excellent purpose in conjunction with night-soil.

Improvement of wheat in Hungary.—Mr. Mokry, a farmer in the county of Békes, Hungary, has been experimenting for eight years on the improvement of wheat, by selection of seed, &c. His efforts having attracted the attention of his government, he has lately received an annual grant to aid him in carrying out his experiments on a large scale. Until quite recently he was unacquainted with the system of Major Hallett, the English experimenter, which would appear to have been in advance of his own, and likely to afford him much assistance toward perfecting his practice. The following is an extract from a report made by Mr. Mokry to his government:

In 1873, I had a field of 40 acres drilled with third-class improved wheat, which gave me 18 metzen (about 34 bushels) per acre, whereas the ordinary seed produced only 5 metzen. I found that a crop of improved wheat was not in the least degree affected by "rost," and a crop of common wheat was totally ruined by it. I have observed that every year it has maintained its increased reproductiveness, even when sown thick and in superficially plowed ground. Seeing, therefore, that in the cases stated the two kinds of seed were drilled under the same conditions of soil and climate, and that one did not receive more care than the other, and that, nevertheless, the pedigree wheat yielded ears as long and as full again as those of the common wheat, I find it demonstrated that the yielding powers of the pedigree wheat can be developed to an almost incredible degree, and that it will assert its superiority even with ordinary treatment and under untoward circumstances. In the unfavorable year, 1874, my first-class improved seed gave 11 metzen per acre, weighing 84 pounds per metzen; the second-class, 7 metzen, weighing 84 pounds; the third-class, (broadcast,) 7 metzen, weighing 83 pounds; and the common seed only 5 metzen per acre, weighing 83 pounds per metzen

NEW AGRICULTURAL MACHINERY.

Machine for weeding wheat.—A machine, known as Jurgenson's Patent Weed Eradicator, has recently been exhibited in England, designed to be used on the growing wheat-crop at the time when the weeds burst into flower, or shortly after their seed-pots have been formed, and before the wheat-plant begins to form ears. The machine may, therefore, be considered as supplementary to the horse-hoe, which, passing between the drills, leaves many weeds mixed with the wheat-plants. Its principal feature is a drum about two feet in diameter, placed horizontally between the main driving-wheels and near the ground, and capable of being raised or lowered by screws. The horse and driver are at one side, as in the mowing-machine. The drum is rotated by means of gearing connected with the driving-wheels, and, as it revolves, three sets of teeth constantly project from and recede to the periphery of the drum, passing, in their return, through slots in its exterior. The wheels are provided with guards which, as the machine passes through the wheat-plants, push the latter aside, preventing them from being crushed. The weed-heads, flowers, or newly-formed seed-pots and stalks, are caught up and held by the teeth, and either stripped or torn off, thus preventing seeding, or if the soil is soft, the weeds are completely pulled up. The blades of the wheat-plants, being, at the stated period, like thin blades of grass, pass between the teeth. An English periodical gives account of a successful trial of the machine on a wheat-field belonging to the farmof Mr. N. Barn-

ingham, where the weeds were so abundant at the flowering stage that the field, seen at a short distance, looked more like a crop of white mustard than one of grain, the green blades of the latter being completely hidden from view. After the machine had been put in operation over a portion of the field the effece was very visible in a series of green strips of cleared grain, contrasting in hue with the yellow appearance of the portions not yetworked over. By careful estimate, fully two-thirds of the weed-plants were pulled up. Occasionally a blade of wheat was broken, or the plant pulled up. But it was claimed that such an occurrence would have been very rare indeed had the weeding been done a fortnight earlier.

Drying hay by machinery.—Mr. W. A. Gibbs, of Gillwell Park, Essex, England, has been for years perfecting a machine for drying hay and grain by artificial heat, being especially designed for use in continued wet weather. A late issue of the London Times give a general description of the machine, by a witness of its operation on the farm of the inventor. Its principal features are as follows: A three-horse-power portable steam-engine, a portable stove made of plate-iron and having an inner chamber for the fire, and, in connection with the stove, a sheet-iron trough. The stove is surmounted by a fan driven by a belt from the engine, and this fan collects the heated air from the coke and drives it, at a temperature of about 400°, into the sheet-iron trough, or drier. This trough is 6 feet broad, and, if mounted on wheels as a portable carriage, 20 feet long, or, if a fixture, 40 to 50 feet long. The end of the trough farthest from the stove is elevated at a low angle. Lengthwise through the middle of the trough extends a hollow ridge, of triangular form, with slits on either side of the base of the ridge to allow passage of the hot-air which is being forced through this hollow portion of the trough. The hay, fed into the elevated end of the trough, is continually stirred and lightened over the hot blast by small iron stirrers, which are made to play in imitation of the movement of hand-forks, and the hay is carried gradually downward toward the stove, helped on by a slow motion of the bottom of the trough. Partly made but wet hay was passed through the machine and converted immediately into thoroughly dry hay for the stack, and freshly-cut grass, saturated with rain from a thunder-shower, was dried into hay of first quality. For drying of the wet hay, the cost of coke used in the stove and coal for the engine amounted to 1*s*. 3*d*. per ton of dry hay. For conversion of the wet grass into hay, Mr. Gibbs's estimate placed the cost of labor, fuel, and wear of apparatus at a sum not exceeding 8*s*. per ton of dry hay.

A Dutch agriculturist, who procured machinery of similar character from Mr. Gibbs, in 1871, gave a statement of the cost, not including that of a steam-engine, substantially as follows: Paid to Mr. Gibbs for apparatus, £65. 9*s*. Additional for freight, import dues, setting up of apparatus, &c., £9. 15*s*. Total, £75. 4*s*.

Horseshoeing.—Mr. George Fleming, veterinary surgeon, (Royal Engineers,) well known to English agriculturists by his essays on horseshoeing, recently read before the London Society of Arts a paper pointing out the following popular errors in practice: Cutting away the covering of the sole till the latter yields to the pressure of the thumb, or even bleeds; cutting away the frog to a shred; removing the bars, and thus impairing the heels; applying a shoe too small for the foot, and then rasping away the horn from the front of the wall in order to fit the shoe, thus greatly weakening the wall, the natural support of the foot, the properly-trained farrier merely reducing the recent growth in length of the horn, as one reduces the length of the finger-nails. Additional to the first-named objectionable practices are the beveling of the surface

of the shoe next the foot, thus bringing the whole pressure of the animal on the already weakened wall of the hoof, and calking the shoes in winter without use of toe-pieces, thus throwing the foot from its just level. Mr. Fleming's system of shoeing consists primarily in the use of a rim of metal, the curve of which extends two-thirds of the length of the wall; this rim to be imbedded so that its outer surface shall lie on a level with the surface of the sole, allowing the sole and frog to reach the ground, and leaving the heels free. The rim, or shoe, "weighs about one-third of the common shoe," and is held firmly in place by only four very small nails. Yet, Mr. Fleming says, this rim wears longer than the heavy shoe which requires eight, ten, or sometimes twelve nails, this longer wearing being in great measure consequent on the assistance given by the sole and frog in supporting the weight of the animal. In case this rim cannot be used, he resorts to a shoe much lighter than the ordinary one, flat toward the foot, and without groove for the nail-holes. The under surface of the shoe is concaved, the bevel suddenly ceasing near the heels, and forming a sort of catch, which operates as a check in slippery weather. He approves the heating of the shoe as a means of completing the adjustment to the foot; the shoe should be sufficiently hot to leave its imprint when momentarily applied. Mr. Fleming adds that his system is practically an improvement on that of M. Charlier, which attracted much attention a few years ago.

AGRICULTURAL-EXPERIMENT STATIONS IN EUROPE.

By Prof. W. O. Atwater, Middletown, Conn.

That the interest in agricultural science, and in institutions especially devoted to its furtherance, is rapidly increasing in this country, is beyond question. Abundant indications of this are apparent in the discussions in farmers' meetings and conventions and in the frequent allusions to the subject in the agricultural press. By far the largest part of the investigations made at present in agricultural science comes from the agricultural-experiment stations. A statement of some of the more important facts concerning the rise, progress, character, and usefulness of the experiment-stations in Europe, where their success has been most remarkable and the fruits of their work have already reached a value beyond calculation, cannot, therefore, fail to be opportune.

In the tenth annual report of the Sheffield Scientific School may be found a most excellent account of the origin, progress, labors, and fruits of the European agricultural-experiment stations by Prof. S. W. Johnson. It bears the appropriate title, "Science as a means of agricultural progress." From this we take the following:

About the middle of the last century, a light-house, known as the Dunston Pillar, was built on the Lincoln Heath, in Lincolnshire, England. It was erected to guide travelers over a trackless, barren waste, a very desert, almost in the heart of England; and long it served its useful purpose. The pillar, no longer a light-house, now stands in the midst of a fertile and rich farming region, where all the land is in high cultivation. For twenty-five years no barren heath has been visible, even from its top. Superphosphate of lime, a chemical invention, first applied to land by the British chemist Murray, and brought to the notice of reading farmers by Baron Liebig, has been the chief means through which this great change was effected. Superphosphate over great stretches of English soil makes, or once made, the turnip crop. Turnips

there support sheep, and with sheep the English farmer knows how to get rich on the poorest light lands.

Liebig, in 1840, called attention to the chemical composition of the guano of Peru. That very year a few casks were imported into England as an experiment. The next year 2,000 tons were brought, and in sixteen years its aggregated sales in Great Britain amounted to $100,000,000. Now Britain, Germany, France, and our seaboard States cannot get enough of it.

Our State of Georgia is officially estimated to expend $10,000,000 annually in the purchase of fertilizers, and single towns in this State lay out $30,000 to $50,000 for guano, phosphates, &c., besides using large quantities of home supplies.

Chemistry has taught agriculture how to utilize the refuse of slaughter-houses and fisheries; the bones, the flesh, the blood, which but a few years ago were a waste, a nuisance, and a peril to the public health. It has found vast mines of fossil phosphates in England, Canada, Norway, Spain, France, Germany, South Carolina, Russia, and, but a few weeks ago, in Austria; and has shown how they may be quickly and profitably converted into a precious fertilizer. * * *

Italy, Germany, France, Britain, and the United States, have seen, or are seeing, the productiveness of thousands of their fields decline to a profitless minimum, until lands once beautiful with harvests are desolate and abandoned. But the artificial barrenness of exhaustion, like the natural barrenness of the heath, or the sand-down, yields to the touch of science; and in all the older countries I have named, the work of reclamation is in full progress, and barring some great calamity of politics or nature, we are confident that the producing power of their soil will never again be less than now, but will increase many fold in the future, until they become gardens in all their breadth and to the very hill-tops.

Many pages might be occupied in recounting the gain which agriculture, like all our industries, has received at the hand of science. It is but a few years since agriculture has been taught in universities and in special agricultural schools, because it is but recently that there has been anything to teach beyond the routine of manual practice that can be learned on any well managed farm. But now the professor of agriculture, the professor of agricultural chemistry, the professor of vegetable physiology, of animal physiology, find superabundant occupation in acquiring, systematizing, and communicating the facts and truths that constitute agricultural science. If in this country their labors in communicating are not excessive, it is because of special circumstances which will soon be changed. * * *

Within a few years farmers, seeing the advantages to be derived from uniting the resources of science with those of practice, in a systematic attempt to improve the methods, operations, and results of agriculture, have begun the establishment of the so-called agricultural-experiment stations.

The object of these stations is to make a regular business of discovery for the use of farming. To this end, farmers have formed associations, contributed land, buildings, cattle, labor, money, and whatever seemed needful or desirable to prosecute this business. They have undertaken it as a means of making money, a means of saving money. They have wanted to know how to save and use manure, in order to make good crops cheaply; how to save and use cattle-food in order to get good beef, wool, and milk cheaply. Aware that accurate and full knowledge of these matters could only be obtained by accurate and numerous experiments, they determined to have the experiments. Feeling that on their own farms the work of experimenting was costly, interfered with the regular business of the place, could not be properly carried on for want of skilled hands, and could not be suitably laid out for want of skilled heads, they united together to bring all these requisites into one focus, so that instead of having to be content with the gratuitous and accidental drippings from the science of the universities and schools, they might have their own well-spring of information, under their own control, and for their own purposes, purely.

They recognized the fact that science had developed the use of many valuable instruments of discovery—the thermometer, the microscope, the balance; that chemical analysis and the art of chemical investigation, which had given to the world phosphorus, superphosphate, chloroform, petroleum, photography, electroplating, and were to give chloral, the superb dyes of coal-tar, and an endless list of benefactions, were veritable engines of progress, and they determined to make full avail of them. They saw, too, that the farm was the place where these might most effectually be put to doing farm-work, and therefore, in the year 1852, a company of Saxon farmers, constituting the Leipzig Agricultural Society, opened the first *farmers' station for agricultural experiment* at the little village of Mœckern, near the city of Leipzig. The society already owned there a small farm, with farm-house, barns, and some improved stock and implements. They engaged Dr. Emil Wolff, a young scientist of promise, to take charge, and Mr. Baehr, the manager of the farm, was instructed to superintend all the practical detail of experiments. Two or three rooms were fitted up as a chemical laboratory, a small glass house was built for vegetation experiments, an assistant chemist was secured, and the experiment-station was an accomplished fact.

This was not, indeed, the first association of farmers for scientific investigations in behalf of agriculture, nor was it the first instance of science taking up her abode on the farm. Scotland had her "Agricultural-Chemistry Association," that, established for a period of five years, began its operations in 1843, and in 1848 was practically merged in the "Highland and Agricultural Society."

France had, so far back as 1835, in the neighborhood of Strasburg, an experiment-station on the farm of Boussingault, who was professor of rural economy in the Conservatory of Arts, in Paris. Both in the laboratory at Paris and on his estate of Bechelbronn, Boussingault has for forty years carried on a series of most valuable researches, whether considered from the point of view of practice or of science.

But Mœckern was the first station where farmers themselves brought science to their own farms to aid them in their own farming. The example there given was so brilliant and solid that within two years another Saxon society, in the town of Chemnitz, set up a second station, and of the twenty-two years that have since elapsed, 1867 is the only one which has failed to witness the founding of one or more similar institutions in Germany or the neighboring countries. The experiment-station shortly came to be regarded not as a costly embellishment or an agricultural luxury, in which universities or wealthy gentlemen might harmlessly indulge, but as a most remunerative and most necessary agency for the use as well as for the education of farmers.

GROWTH OF THE EXPERIMENT-STATIONS.

The growth of the stations in numbers and in appliances for work since the inception of the idea at Mœckern in 1852, has been as interesting as it is remarkable. There were in 1857, eleven; in 1862, nineteen; in 1867, thirty; in 1872, sixty-two; and there are now (October, 1876,) not far from eighty of these institutions in active operation in Europe. In addition to these are a number of laboratories connected with educational institutions or maintained by societies or individuals, which, though not technically experiment-stations, are yet engaged in investigations and experiments in agricultural science.

The experiment-stations are indigenous to Germany. In that country they originated; there they have been most carefully fostered, have received the most substantial support, and produced the most useful results.

It is worthy of note that among the earliest means adopted by Germany for pacifying and bettering the condition of the provinces of Alsace and Lorraine, which her military might had wrested from her ancient transrhenish rival were—in full accord with the policy that had prepared her for her great victory—the establishment at Strasburg of a university, and at Rufach of an agricultural-experiment station.

But the other European states have been, though tardily, yet of late energetically, following the example set by Germany. In 1868, M. Grandeau, a prominent French agriculturist, undertook a journey through Germany to visit the experiment-stations, and made a report to the French government, whereupon steps were taken to establish a number of stations in France. Since the Franco-German war, however, but little has been heard from any except two or three of them.

A similar enterprise was undertaken in Belgium, and with better success. M. Lejeune, director of the Royal Agricultural School at Gembloux, made a tour of inspection among the German stations, and when the results of his observations were made known, a society of leading farmers and others was formed for founding experiment-stations in Belgium. The first and central station was established at Gembloux in 1872. Buildings were provided, government aid was invoked, and 20,000 francs, (about $2,000 in gold,) were at once placed at the disposal of the station for the first equipment, and 10,000 francs per annum for current expenses. A second is now in successful operation in Ghent.

Italy, freed from the bigotry of Papal rule and united under the liberal leadership of Victor Emanuel, was quick to recognize the need of

the most advanced science for the development of her most important industry. The government, through the minister of agriculture and commerce, caused a report on the German stations to be made by Prof. Alphonso Cassa. This report was published in 1870. Thereupon it was decided to have agricultural experiment-stations in Italy also. In the beginning of the year 1872 there were seven, which number has since been increased to thirteen experiment-stations in active operation. One of these is especially devoted to investigations in grape-culture, another to the culture of the olive, a third to dairying, a fourth to feeding-experiments, a fifth to experiments on plant-growth, and so on. On January 20, 21, and 22, 1873, was held in Rome the first meeting of the directors of the Italian stations. Cheering accounts of progress were given. Among other reports were those of experiments in sugar-beet culture, which indicated that the sugar-beet industry could be introduced in that country with the best prospect of success.

It is extremely difficult to obtain exact statistics of all the European stations. Yearly reports of the status of the German stations, and particularly those of Prussia, are given in official and other agricultural journals. But the attainable data concerning those of the other countries are so fragmentary and incomplete that it is often impossible, at least from the sources to which the writer has access, to learn definitely when a given station was founded, what are its equipments, revenues, and the character of its work, or whether the organization of a given institution is such that it would properly be classed as an experiment-station or not.

The following statistics are taken chiefly from a *Revue über den Bestand des landwirthschaftlichen Versuchswesen im Jahre* 1874, by Nobbe; the *Landwirthschaftlichen Versuchsstationen*, the *Landwirthschaftlichen Jahrbücher*, and a few other German agricultural journals.

The table below gives the numbers of the agricultural experiment-stations at present in operation in the different countries of Europe, and of laboratories supported by agricultural schools, societies, or private individuals, which, though devoted to agricultural investigations, are not classed as experiment-stations.

	Experiment-stations.	Other agricultural laboratories.		Experiment-stations.	Other agricultural laboratories.
GERMANY.			Alsace-Lorraine	2	......
Prussia	23	......	German Empire	50	13
Bavaria	6	......	Austro-Hungarian Empire	7	2
Saxony	6	......	Belgium	2	......
Würtemberg	2	......	Holland	1	......
Baden	2	......	France	2	......
Hessen-Darmstadt	1	......	Italy	13	......
Brunswick	1	......	Switzerland	2	......
Mecklenburg-Schwerin	2	......	Russia	2	11
Saxe-Weimar	2	......	Great Britain	......	3
Saxe-Meiningen	1	......			
Anhalt	1	......	Total	79	29
Oldenburg	1	......			

The institutions above mentioned as devoted to agricultural investigations, but whose organization is not such as to class them as experiment-stations, are worthy of especial mention. A number are connected

with agricultural schools or universities. Such are the laboratories of the universities of Giessen and Munich, where the great master, Justus Liebig, pursued his labors for more than forty years, and the laboratory of the Royal School of Agriculture and Forestry, at Tharandt, whence Adolph Stœckhardt went to preach his chemical field-sermons through all the villages of Saxony, and the laboratory of the Agricultural Institute of Leipsic, where Knop has carried on many of his well known investigations, and for which a new building is soon to be erected. Indeed, nearly all of the leading German universities have such agricultural laboratories.

In Russia, eight universities have, since 1864, had connected with their professorships of agricultural chemistry, chemical laboratories, with generally a chemical assistant, two servants, besides a yearly appropriation of 1,000 rubles ($778 gold) for expenses of experiments. Still better provisions are made for agricultural experiments in each of three Russian agricultural schools.

The private laboratory and experimental farm of Boussingault, at Bechelbronn, in Alsace, are famous for researches in agricultural chemistry and physiology, which have extended through a period of over forty years, and have long been classic.

In Great Britain there are no experiment-stations, in the technical sense of the term. The four agricultural laboratories referred to in the table are those of Mr. Lawes, at Rothamstead; of the Royal Agricultural Society, in London; of the University of Glasgow, where Professor Andersen has, with assistants, been employed for many years by the Highland Agricultural Society, and of the Royal Agricultural College at Cirencester.

The first of these, long famous from the admirable laboratory, field, and stall experiments, jointly carried on by Mr. J. B. Lawes and Dr. J. H. Gilbert, which are very familiar to American readers, is, in fact, the most magnificently endowed station in Europe. The second gives employment to Dr. A. Voelcker, chemist to the Royal Agricultural Society, and some six assistants. In amount and usefulness of work this is equaled by but few of the continental stations.

HOW FOUNDED AND SUPPORTED.

The majority of the German and a large number of the other European stations have been founded through the instigation of agricultural societies or prominent farmers, by whom a considerable part of the expense is borne. They are very often projected by societies and established by government aid. Of late, however, the governments of several countries are becoming so impressed with the value of the stations as to organize numbers of new ones independently of the action of farmers.

REVENUES AND WORKING-FORCE.

The sources of revenue of the stations are various. They are generally sustained in part, but seldom entirely, by government appropriations. Many of the stations derive considerable, and some a good share, of their revenue from investigations of fertilizers, fodder-material, and seeds. Aid is given to many by agricultural societies; private individuals, neighboring cities, a railroad company, a bank, and even an insurance company are included in the list of the contributors to the support of the stations.

The annual revenues of the German stations vary from some $550 to

$5,230 gold. Some ten have over $2,422 (10,000 marks) per annum. The stations in the other countries are generally less generously endowed than those in Germany; a notable exception, however, is found in the station at Vienna, which, according to accounts in 1874, had nearly $10,000 gold per annum at its disposal.

The most magnificently endowed of all the European stations is that at Rothamstead, in England. This is situated on the farm of Mr. J. B. Lawes, possesses a well equipped laboratory and extensive fields, and has been maintained by that gentleman "since 1845, at an annual cost of some $15,000. The laboratory and experimental grounds, with an endowment-fund of £100,000, have been placed in trust by Mr. Lawes, to remain forever devoted to the investigation of agricultural science."

As working-force, the stations have each a director, and generally one or more assistants, exclusive of janitors or servants. One German station has five assistants. Three have three, and the rest two or less each. In 1874, over 100 chemists were laboring in the direct interest of advanced agriculture in Germany alone. It must be borne in mind that not only current expenses, but especially the skilled labor of chemists, is much cheaper in Europe than in this country. The salaries of efficient chemists as assistants in the stations amount often to less than one-third or one-fourth of what would be paid for similar services in this country.

The following statement of the revenues and working-force of the Prussian agricultural experiment-stations for the year 1874 is taken from the Landwirthshaftliche Jahrbücher, IV. Band, 1875, supplement:

REVENUES OF PRUSSIAN EXPERIMENT-STATIONS.

The revenue for the station at Eldena is derived from the fund standing at the disposal of the agricultural academy at that place for laboratory, experimental fields and stables, botanical garden, &c. The revenues of the station at Proskau amounts to 10,695 marks, ($2,590 gold.)

The station at Poppelsdorf receives from the government 7,350 marks. The revenues and working force of each of the remaining Prussian stations is shown in the following table:

Name of station.	Revenue in marks; 1 mark = 24.2 cents gold.					Working force.
	From government.	From agricultural societies.	From analyses of fertilizers.	From private contributions.	Total.	
Halle	3,600	....	18,000	....	21,600	Director and 5 assistants.
Wunde-Göttingen	4,560	4,410	600	....	9,570	Director and 2 assistants.
Bonn	2,640	4,350	5,400	....	12,390	Director.
Kiel	2,400	....	*5,100	....	7,500	Director and 1 assistant.
Munster	3,600	1,860	3,330	....	8,790	Director and 1 assistant.
Dalune	10,200	1,350	150	150	11,850	Director and 3 assistants.
Regenwalde	5,200	1,620	540	....	7,560	Director and 2 assistants.
Insterburg	2,550	1,200	1,710	....	5,460	Director.
Kuschen	4,200	1,575	573	(†)	6,348	Director and 1 assistant.
Altmorschen	3,900	168.05	‡921.2	§693.7	5,682	Director and 1 assistant.
Wiesbaden	7,110	....	1,372.5	....	8,482	Director and 2 assistants.
Hildesheim	1,500	900	9,300	1,560	13,260	Director and 1 assistant.
Eda-Marienhütte	3,600	900	5,995.5	(‖)	10,495	Director and 2 assistants.

* From manufactures of fertilizers 3,600; from analyses 1,500.

† Buildings, garden, land, cattle, &c., for experiments furnished gratuitously by Herr Lehmann.

‡ 109.7 marks of this amount from interest of capital stock loaned by an agricultural society to the station.

§ From the Aix Munich Fire-Insurance Company.

‖ Laboratory rooms and dwellings of director, assistants, and servants, together with salaries of last furnished by heirs of the late Privy-Councillor von Kulrais.

EQUIPMENT AND LOCATION OF STATIONS.

The equipments of the stations and appliances for work are quite various. The smaller and younger institutions have often only two or three rooms fitted up for a chemical laboratory in a building cheaply rented for the purpose; while the older and larger stations sometimes have fine buildings put up especially for their use, and containing not only large and generously-equipped laboratories, but also tenements for the director and assistants. The station at Halle passed six years of its career on a farm at Salzmünde, some miles outside of the city. In 1865, it was transferred to Halle, and located in a small dwelling-house, on grounds adjacent to the agricultural institute of the university. In ten years it had outgrown its accommodations. A lot was purchased at a cost of 10,000 thalers, and a building erected at a cost of 25,000 thalers more, making a total of 35,000 thalers, or about $25,000. The funds for the purpose were provided from the earnings of the station and by the Provincial Agricultural Society, in whose management it stands.

In the earlier history of the stations it seems to have been very generally deemed desirable to have farms connected with them, and many were established on farms outside of the towns. But later experience has shown that the most valuable work is done not in field-experiments and farm-stables, but in the greenhouse, the station-stalls, the respiration-apparatus, and the laboratory. The largest of the German stations, the one just mentioned at Halle, has no more land connected with it than a small garden. The station at Tharand has, outside of the laboratory, only a greenhouse. That at Mœckern has a farm, but for many years no accounts have been published of experiments made upon it. The station at Hohenheim is connected with an agricultural school, which possesses a large farm. It has a greenhouse for plants and stalls for cattle under experiment, but makes scarcely any use of the farm. The station at Weende was located upon a farm, which it did not use for years except as a source of materials needed for experimenting in the stalls, the respiration-apparatus, and the laboratory, and it has at length been found advisable to remove the station to the adjoining city of Göttingen, and place it in direct connection with the university there. The stations just named are among the largest, oldest, and most important of the German stations. They have been managed by the wisest practical and scientific men, and have been most successful in the production of results of actual use to agriculture, and, profiting by the results of long experience, the founders of new stations are locating them in the cities, and, so far as practicable, in connection with the large universities. In fact, paradoxical as it may seem, the abstract researches which bring the most practical benefit to farming are made, not on a large scale in the country, upon the farms, but in the towns, where individual or small numbers of plants and animals can be experimented upon, with the aid of such close, patient, and thorough investigation as can be furnished only with the aid of the best scientific appliances and talent, and these are most easily secured in cities and in connection with scientific institutions. Professor Henneberry, for years director of the experiment-station at Weende, and author of some of the most thorough and useful series of feeding-experiments with domestic animals that have ever been performed, remarks, in his last work on researches in cattle-feeding, (*Neue Beiträge, s.* xxvii,) that "it is self-evident that the highest usefulness of the experiment-stations in the field of animal-production is dependent

upon their connection with institutions which have persons skilled in the science of physiology."

It must not be understood from this that farm-experience and the use of farm-appliances are unnecessary to the work of experiment-stations, but rather that immediate connection with scientific men, books, and appliances is of more importance than immediate connection with a farm. It is easier for the practical farmer to experiment with his crops and stock upon his farm in accordance with plans which he and the chemist or physiologist together may devise, and bring the results to the laboratory for further and more accurate investigation, than for the chemist and physiologist to carry their laboratory, apparatus, and, what is only little less important to them, the paraphernalia and associations of scientific institutions and scientific men, to the farm.

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